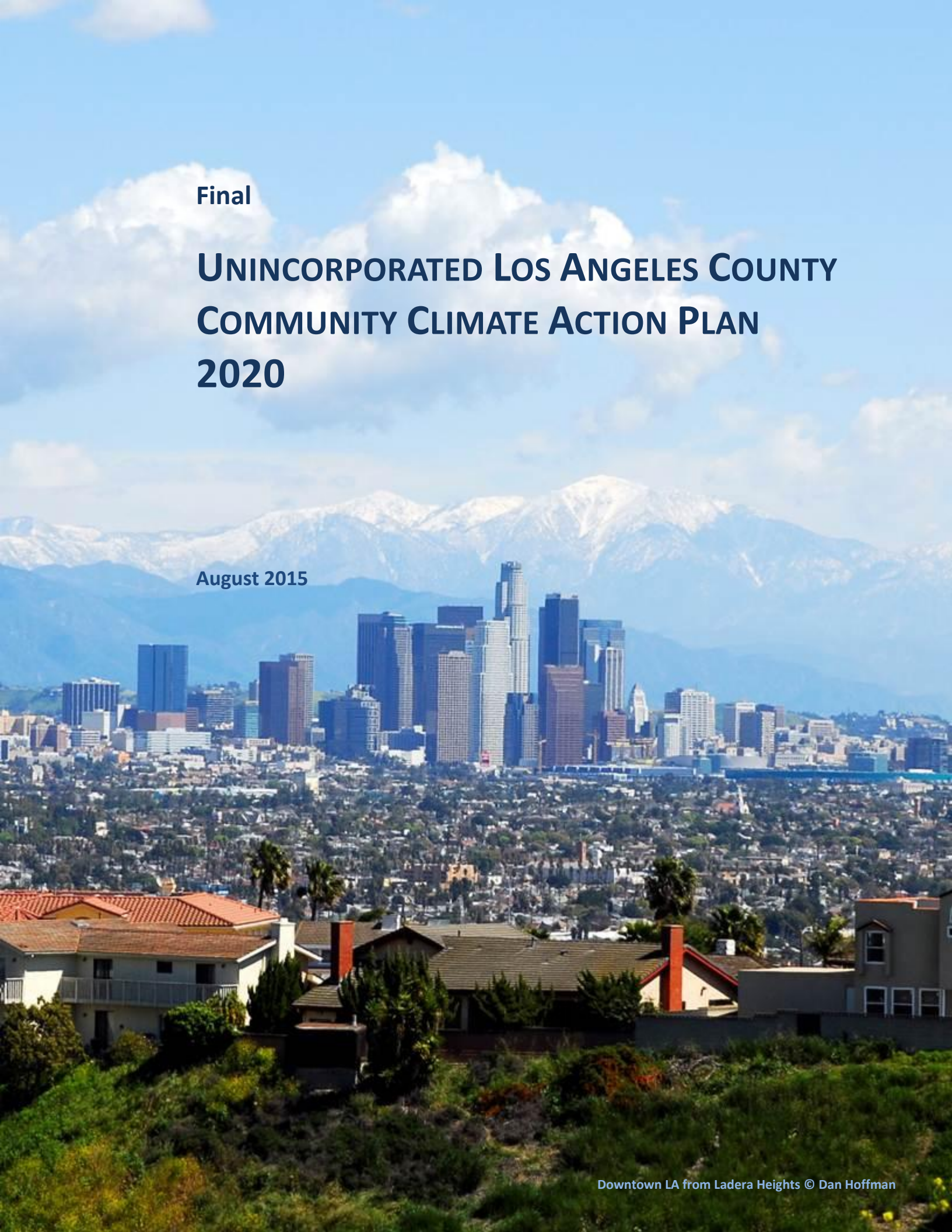
Final

Unincorporated Los Angeles County Community Climate Action Plan 2020

August 2015



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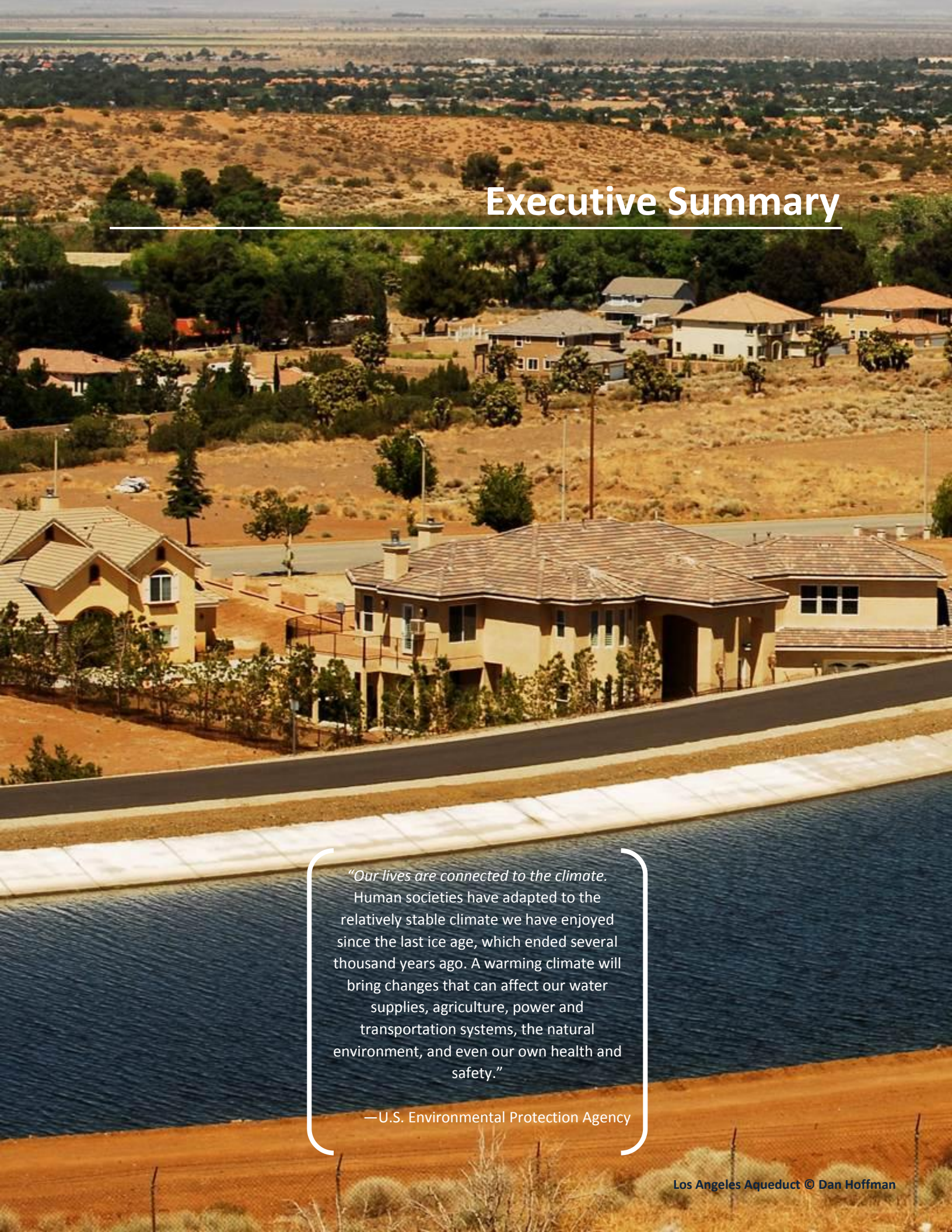
Executive Summary

"Our lives are connected to the climate. Human societies have adapted to the relatively stable climate we have enjoyed since the last ice age, which ended several thousand years ago. A warming climate will bring changes that can affect our water supplies, agriculture, power and transportation systems, the natural environment, and even our own health and safety."

—U.S. Environmental Protection Agency



Los Angeles Aqueduct © Dan Hoffman

ES.1 Introduction

The County of Los Angeles (County) acknowledges the consensus among leading scientists that without action to reduce greenhouse gas (GHG) emissions, climate change due to global warming will pose a considerable threat to the environment and to human health and society.

To reduce the impacts of climate change, the County has set a target to reduce GHG emissions from community activities in the unincorporated areas of Los Angeles County by at least 11% below 2010 levels by 2020. This Community Climate Action Plan (CCAP) describes the County's plan for achieving this goal, including specific strategy areas for each of the major emissions sectors, and provides details on the 2010 and projected 2020 emissions in the unincorporated areas. The CCAP is a component of the Los Angeles County General Plan.

Implementing State measures and the local measures in the CCAP would avoid the generation of more than 1.9 million metric tons of carbon dioxide equivalent (MT CO_2e), which is equivalent to the following actions in 2020 (U.S. Environmental Protection Agency 2014):

- Removing more than 411,000 passenger vehicles from the road.
- Reducing gasoline consumption by more than 220 million gallons.
- Providing renewable energy to power over 178,000 homes.

The actions in the CCAP are priority actions and intended for near-term implementation, such that the County can achieve its GHG reduction goal for 2020 for the unincorporated areas of Los Angeles County.

ES.2 Greenhouse Gas Emissions in the Unincorporated County

Estimated GHG emissions generated by community activities in the unincorporated areas in 2010 were approximately 7.9 million MT CO_2e (Figure ES-1). This is equivalent to the annual GHG emissions generated by approximately 1.6 million passenger vehicles and represents per capita emissions of 7.5 MT CO_2e for each of the unincorporated areas' 1 million residents. Of these total emissions, as shown in Figure ES-1, building energy use is the largest source of emissions (49%). Transportation emissions from on- and off-road vehicles are the second largest source of emissions (42%). The third largest source is community waste generation (7%). The remaining sources are water conveyance and wastewater generation (2%), agriculture (0.4%), and stationary sources (0.02%).

The CCAP is composed of State and local actions to reduce GHG emissions within the unincorporated areas. The State actions considered in the CCAP include: the Renewables Portfolio Standard, Title 24 Standards for Commercial and Residential Buildings (Energy Efficiency and CALGREEN), Pavley/Advanced Clean Cars (Vehicle Efficiency), the Low Carbon Fuel Standard, and the California cap-and-trade program. These State actions generally do not require action from the County, but will result in local GHG reductions in the unincorporated areas.

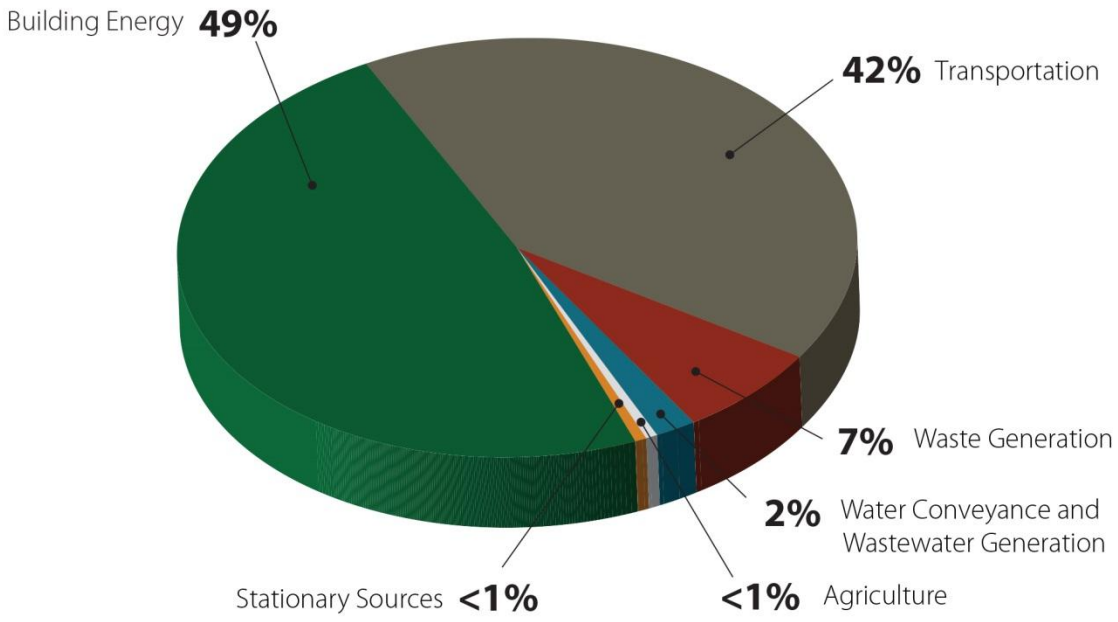


Figure ES-1. 2010 GHG Inventory for Unincorporated LA County by Sector

ES.3 CCAP Actions to Reduce Greenhouse Gas Emissions

There are 26 local actions included in the CCAP. The local actions are grouped into five strategy areas: green building and energy; land use and transportation; water conservation and wastewater; waste reduction, reuse, and recycling; and land conservation and tree planting. Many of the local actions are cost effective, particularly in the green building and energy strategy area, with several energy efficiency investments that can recoup initial costs in one to five years. In addition to reducing GHG emissions, all local actions have many co-benefits, such as improved public health.

The following summaries for each strategy area include information on existing and continuing initiatives, estimated GHG reductions and costs/savings (as available), potential community co-benefits, and the relevant CCAP actions.

Green Building and Energy

CO-BENEFITS:

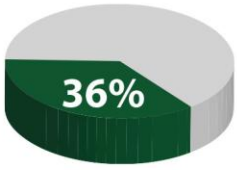
Existing Initiatives:

The County has developed a number of energy efficiency and renewable energy programs, including the following. Continued implementation of these programs will support actions identified in the CCAP.

- **Energy Upgrade California**
  Provides rebates and incentives for efficiency projects.
- **Los Angeles County Code (Title 31)**
  Identifies sustainable policies for new building design.
- **Commercial Building Performance Partnership**
  Provides innovative financing mechanisms to fund energy efficiency upgrades.
- **Renewable Energy and Clean Fuels Program**
  Implements projects to accelerate use of compressed natural gas as an alternative fuel.

2020 Emissions Reduction
139,968
(MT CO_2e)

Percent of Local Emissions Reduction*



Up to
$55 Million
In Cost Savings

* Reductions achieved by State programs are not included in the percentage.

New Actions:

New actions identified in the CCAP will achieve additional GHG reductions by 2020 by expanding green building initiatives and popular efficiency programs. Actions identified in the CCAP include the following:

- **BE-1: Green Building Development.** Encourages energy reductions in new development.
- **BE-2: Energy Efficiency Programs.** Sets goals for energy efficiency retrofits for existing development.
- **BE-3: Solar Installations.** Encourages solar installations for new and existing buildings.
- **BE-4: Alternative Renewable Energy Programs.** Promotes alternative renewable energies.
- **BE-5: Wastewater Treatment Plant Biogas.** Encourages renewable biogas projects.
- **BE-6: Energy Efficiency Retrofits of Wastewater Equipment.** Promotes efficient treatment equipment.
- **BE-7: Landfill Biogas.** Encourages renewable biogas projects at regional landfills.

Land Use and Transportation

CO-BENEFITS:

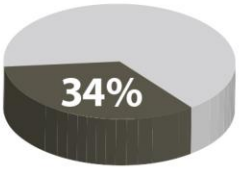
Existing Initiatives:

Like most California communities, a significant portion of the County's emissions are from on-road transportation sources. Developing realistic ways to reduce vehicle trips and vehicle miles traveled has therefore been a priority. The following are key transportation initiatives already undertaken by the County. Continued implementation of these programs will support actions identified in the CCAP.

- **Healthy Design Ordinance**
  Promote physical activity, walkability, and access.
- **Bicycle Master Plan**
  Promotes bicycle ridership and bike-friendly design throughout the County.
- **Sustainable Transportation Programs**
  Includes programs to increase the efficiency of the transportation network.

2020 Emissions Reduction
129,064
(MT CO_2e)

Percent of Local Emissions Reduction*



* Reductions achieved by State programs are not included in the percentage.

Note: Cost savings not available.

New Actions:

New actions identified in the CCAP will achieve additional GHG reductions by 2020 with land use changes, network improvements, new pedestrian and bicycle infrastructure, and many other actions. Actions identified in the CCAP include the following:

- **LUT-1: Bicycle Programs and Supporting Facilities.** Expands and improves facilities for cyclists.
- **LUT-2: Pedestrian Network.** Improves pedestrian infrastructure to promote walking and access to transit.
- **LUT-3: Transit Expansion.** Creates bus priority lanes and improves transit facilities and amenities.
- **LUT-4: Travel Demand Management.** Encourages employer-sponsored programs to reduce vehicle use.
- **LUT-5: Car-Sharing Program.** Provides on-demand access to a shared vehicle fleet.
- **LUT-6: Land Use Design and Density.** Promotes sustainability in land use design.
- **LUT-7: Transportation Signal Synchronization Program.** Enhances traffic signal synchronization.
- **LUT-8: Electric Vehicle Infrastructure.** Promotes electric vehicle infrastructure.
- **LUT-9: Idling Reduction Goal.** Limits idling time for heavy-duty construction equipment.
- **LUT-10: Efficient Goods Movement.** Maximizes the efficiency of goods movement.
- **LUT-11: Sustainable Pavements Program.** Improves the efficiency of pavement rehabilitation.
- **LUT-12: Electrify Construction and Landscaping Equipment.** Establishes electrification goals for equipment.

Water Conservation and Wastewater

CO-BENEFITS:

Existing Initiatives:

The County has developed conservation rebates, smart gardening workshops, and storm water control. The following is a sample of some of the water-saving rebates currently offered by the County.

- **$100 for high efficiency clothes washers**
- **$4 for rotary sprinkler nozzles**
- **$235 for weather-based sprinkler controllers**
- **$1 per square foot water-efficient landscaping**

Existing programs like those described above have consistently reduced annual per capita water consumption in unincorporated LA County. Continued implementation of these programs will support actions identified in the CCAP.

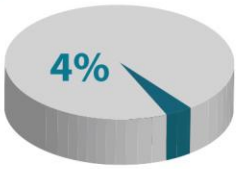
2020 Emissions Reduction

101,675

(MT CO_2e/Year)

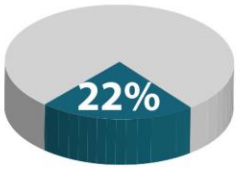
Water Sector Reductions:
15,303 MT CO_2e/Year

Percent of Local Emissions Reduction*



Building Energy Sector Reductions:
86,371 MT CO_2e/Year

Percent of Local Emissions Reduction*



* Reductions achieved by State programs are not included in the percentage.

Note: Cost savings not quantified.

New Actions:

New actions identified in the CCAP will achieve additional GHG reductions by 2020 through water conservation and use of recycled water. Reduced water consumption will likewise contribute to reductions in building energy use. For example, efficient faucets that use less water will require less electricity and natural gas for hot water heating. Reducing water demand will therefore conserve water and save energy. Actions identified in the CCAP include the following:

- **WAW-1: Per Capita Water Use Reduction Goal**
  Reduces per capita water consumption; goals range from 5-20% below baseline values.
- **WAW-2: Recycled Water, Water Supply Improvement Programs, and Stormwater Runoff**
  Encourages use of recycled and grey water.

Waste Reduction, Reuse and Recycling

CO-BENEFITS:

Existing Initiatives:

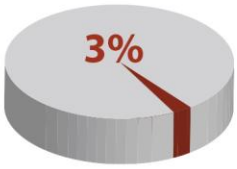
The County has developed and implemented a number of recycling programs for community waste and construction and demolition waste. These programs collectively divert more than 50% of waste generated in the County to recycling centers and other end uses. Continued implementation of these programs will support actions identified in the CCAP.

2020 Emissions Reduction

12,212

(MT CO_2e)

Percent of Local Emissions Reduction*



* Reductions achieved by State programs are not included in the percentage.

New Actions:

The following new action identified in the CCAP will achieve additional GHG reductions by 2020 by setting a waste diversion goal for the unincorporated County of at least 75%.

- **SW-1: Waste Diversion Goal.** Reduces landfilled waste by diverting at least 75% of waste.

Land Conservation and Tree Planting

CO-BENEFITS:

Existing Initiatives:

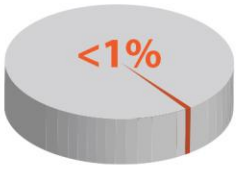
The County has developed an urban forestry plan and an oak woodlands conservation management plan. *The Oak Woodlands Conservation Management Plan* includes policies to address the loss and creation of oak woodlands in LA County. Continued implementation of these programs will support actions identified in the CCAP.

2020 Emissions Reduction

1,126

(MT CO_2e)

Percent of Local Emissions Reduction*

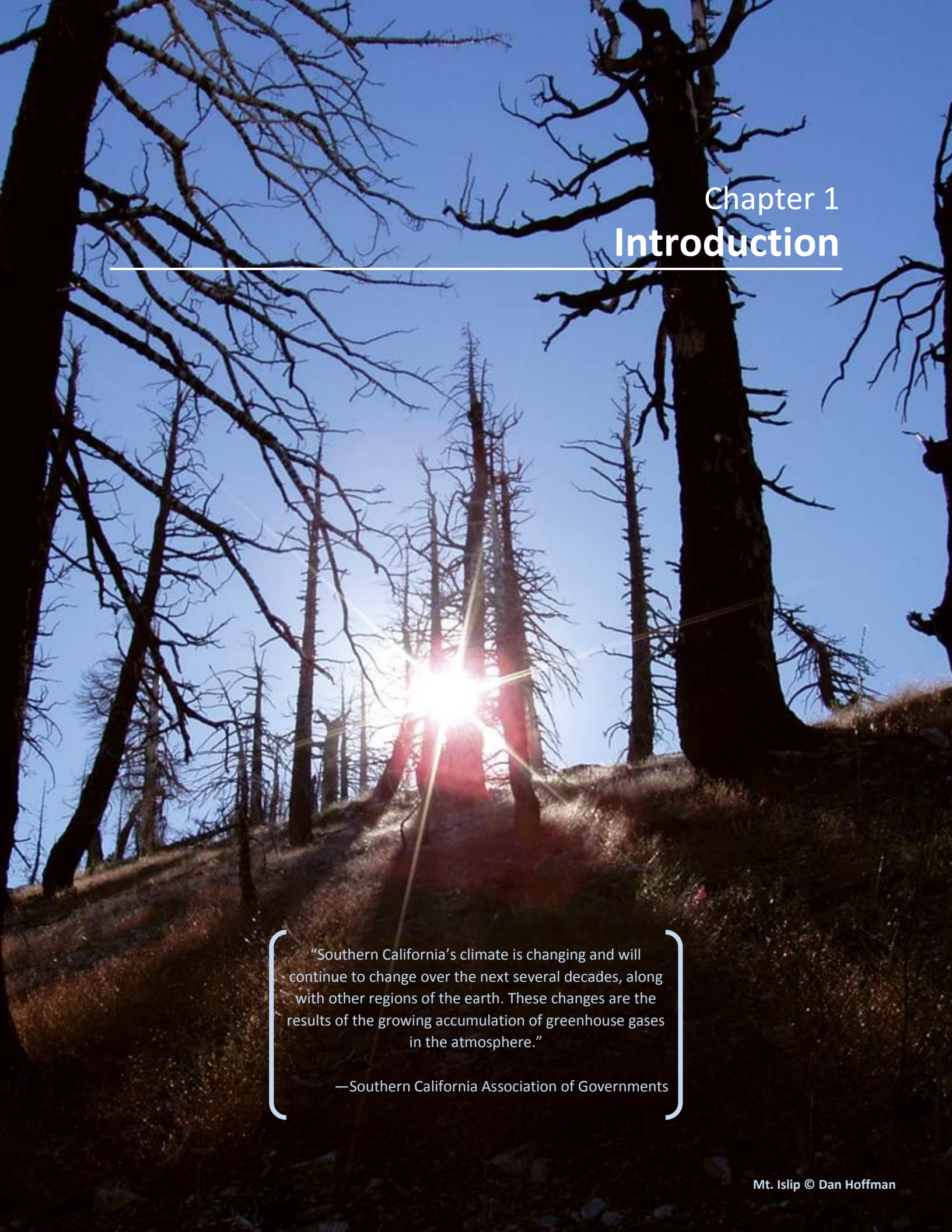


* Reductions achieved by State programs are not included in the percentage.

New Actions:

New actions identified in the CCAP will achieve additional GHG reductions through carbon sequestration by 2020 by both conserving existing and creating new natural spaces. The following actions are identified in the CCAP.

- **LC-1: Develop Urban Forests.** Supports and expands urban forest programs.
- **LC-2: Create New Vegetated Open Space.** Promotes land restoration and re-vegetation.
- **LC-3: Promote the Sale of Locally Grown Foods and/or Products.** Supports locally grown food.
- **LC-4: Protect Conservation Areas.** Encourages protection of current natural areas.



Chapter 1

Introduction

"Southern California's climate is changing and will continue to change over the next several decades, along with other regions of the earth. These changes are the results of the growing accumulation of greenhouse gases in the atmosphere."

—Southern California Association of Governments

Mt. Islip © Dan Hoffman

1.1 Purpose of the Community Climate Action Plan

The County of Los Angeles (County) has developed the Community Climate Action Plan (CCAP) to reduce and avoid greenhouse gas (GHG) emissions associated with community activities in the unincorporated areas of Los Angeles County. The CCAP demonstrates the County's leadership and role in contributing to statewide GHG emission reductions. The CCAP addresses emissions from community activities in the following sectors: building energy, transportation, water conveyance and wastewater processing, and waste generation. The CCAP also establishes a GHG reduction target consistent with the State's efforts to reduce GHG emissions, and provides a roadmap for successfully implementing GHG reduction measures selected by the County.

The actions outlined in the CCAP tie the County's existing climate change initiatives together, and provide a blueprint for a more sustainable future. As a component of the General Plan Air Quality Element, the CCAP actions are closely tied to many of the goals, policies, and programs of the General Plan, as well as to several other existing programs in the County. Actions undertaken as part of the CCAP will also result in important community co-benefits, including improved air quality, energy savings, increased mobility, and enhanced community well-being, and will enrich the resiliency of the community in the face of changing climatic conditions. Furthermore, the CCAP satisfies the County's goals of meeting the recommendations for local governments in the Scoping Plan of Assembly Bill (AB) 32, California's Global Warming Solutions Act.

1.2 How to Use the CCAP

The CCAP is a resource for the unincorporated areas. Residents, businesses and their employees, community groups, and the public at large are encouraged to participate in community engagement activities for the CCAP, and the implementation of specific CCAP programs, as described in Chapter 5. Throughout the implementation of the CCAP, County staff will work closely with stakeholders to effectively implement the CCAP.

Public agencies and private developers can also use the CCAP to comply with project-level review requirements pursuant to the California Environmental Quality Act (CEQA). CEQA guidelines specify that CEQA project evaluation of GHG emissions can "tier off" a programmatic analysis of GHG emissions, provided that the programmatic analysis (or climate action plan) does the following (CEQA Guidelines Section 15183.5):

- Quantify greenhouse gas emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable.
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.
- Specify measures or a group of measures, including performance standards that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.

- Monitor the plan's progress.
- Adopt the GHG Reduction Strategy in a public process following environmental review.

The CCAP meets CEQA Guidelines Section 15183.5 listed above by: 1) quantifying all primary sectors of GHG emissions within the unincorporated areas for 2010 and 2020; 2) including a reduction target of at least 11% below 2010 levels, which is consistent with the recommendations in the AB 32 *Scoping Plan* for municipalities to support the overall AB 32 reduction targets; 3) analyzing community emissions for the unincorporated areas as a whole and including predicted growth expected by 2020; 4) including specific measures to achieve the overall reduction target; 5) including periodic monitoring of plan progress; and 6) submitting the CCAP to be adopted in a public process following compliance with CEQA.

Once the CCAP is adopted, project-specific environmental documents that incorporate applicable CCAP actions can "tier off" the Environmental Impact Report (EIR) certified for the County General Plan and CCAP to meet project-level CEQA evaluation requirements for GHG emissions. Tiering from the General Plan EIR potentially eliminates the need to prepare a quantitative assessment of project-level GHG emissions. Rather, project-specific environmental documents that rely on the CCAP can qualitatively evaluate GHG impacts by identifying all applicable CCAP actions and describing how those actions have been incorporated into the project design and/or identified as mitigation. This type of "tiered" analysis can reduce project costs and streamline the County permit process. Projects that demonstrate consistency with applicable CCAP actions can be determined to have a less than significant cumulative impact on GHG emissions and climate change (notwithstanding substantial evidence that warrants a more detailed review of project-level GHG emissions).

Figure 1-1 shows the benefits of "tiering off" an EIR certified for a climate action plan (also known as "project streamlining") to meet CEQA requirements.

CEQA WITH A CCAP
CCAP + EIR*
Eligible projects will tier off the environmental document certified for the General Plan and CCAP. The project-level analysis will evaluate consistency with the CCAP policies and goals.
*The County expects to use the Environmental Impact Report for the Draft General Plan 2035 as the basis for CEQA compliance for this project
CEQA WITHOUT A CCAP
Project-level GHG analysis for individual projects
A complete analysis of the GHG emissions associated with individual projects is required, including a quantitative demonstration that the project will reduce emissions below the specified level.

Figure 1-1. Project Streamlining: Benefits of a Climate Action Plan

1.3 Prior County Efforts on Climate Change and Relationship to Other County Plans

The County has long been a leader in addressing climate change. It first began programs to improve its own (municipal) building energy efficiency and resource conservation in the mid-1990s. Since that time, the County has adopted numerous programs that target various types of municipal energy reductions, including a commitment in the Countywide Energy and Environmental Policy to reducing energy use in County-operated buildings by 20% by 2015. To promote leadership on climate change through emissions reporting and verification, the County joined the California Climate Action Registry (CCAR) in 2007. The CCAR is a voluntary GHG reporting registry that promotes early actions to reduce greenhouse gas emissions. At its meeting on October 23, 2007, the County Board of Supervisors agreed to join a coalition of counties throughout the United States by signing the U.S. Cool Counties Climate Stabilization Declaration. The Declaration committed the County to a number of actions on GHG reductions, including working with other governments and leaders to reduce County geographical GHG emissions to 80% below current levels by 2050. The County's Office of Sustainability (COS) was created within the Internal Services Department by the Board of Supervisors in October 2009 to respond to legislation, regulation, and policy related to climate change. The County has also joined the Los Angeles Regional Collaborative for Climate Action and Sustainability (LARC). Through this regional collaborative, the County shares resources with other jurisdictions and encourages collaboration on local efforts to address climate change.

1.3.1 General Plan

The General Plan provides the policy framework for growth in unincorporated areas through the year 2035. It is based on current demographic data and reflects regional growth, resource protection regulations, State law, and local ordinances. The General Plan also provides a guide for future land use patterns.[1]

The CCAP, which is based on similar data and assumptions, is a component of the Air Quality Element of the General Plan. The CCAP may be updated without requiring modification to other parts of the General Plan, as the County anticipates updating the CCAP on a periodic basis to reflect any needed changes to emissions data or to CCAP actions in order to continue to achieve the CCAP's goals.

1.3.2 Municipal Climate Action Plan

The County is currently developing a Municipal Climate Action Plan (MCAP). The MCAP will include various programs and policies that will reduce municipal GHG emissions to 15% below current levels. The MCAP focuses on GHG emissions that result from the County's municipal operations and does not include GHG emissions generated by the community (i.e., these emissions are included in the CCAP). The MCAP includes municipal emissions from the following sectors: building energy;

[1] The General Plan Update is currently underway and will replace all elements of the current General Plan.

cogeneration facilities; vehicle fleet; owned landfills; refrigerants; wastewater treatment plants; street and outdoor lighting; water pumps; water conveyance; waste generation; employee commute; and miscellaneous direct emissions.

The MCAP and CCAP are distinct plans with separate approval processes and timelines. However, there may be some minor overlap in the emissions that are accounted for in both plans, particularly in the wastewater, water, lighting, and employee commute emissions sectors where County facilities and actions occur in the unincorporated areas. The emissions in these sectors may be counted as both "municipal" and "community" emissions. For example, employee commute emissions are counted as municipal emissions and included in the MCAP, but may also occur in the unincorporated areas and would therefore be included in vehicle miles traveled data for the unincorporated areas. As such, there may also be some overlap in the associated actions to reduce these emissions, as illustrated in Figure 1-2. Because many of the County's operations take place within the jurisdiction of cities and pertain only to municipal operations, the County's municipal emissions have little overlap with community emissions in the unincorporated areas. To the extent that any overlap of programs or policies may occur, the County anticipates working with all appropriate departments and stakeholders to ensure that these programs and policies are developed as efficiently as possible, while still meeting the goals of both plans.

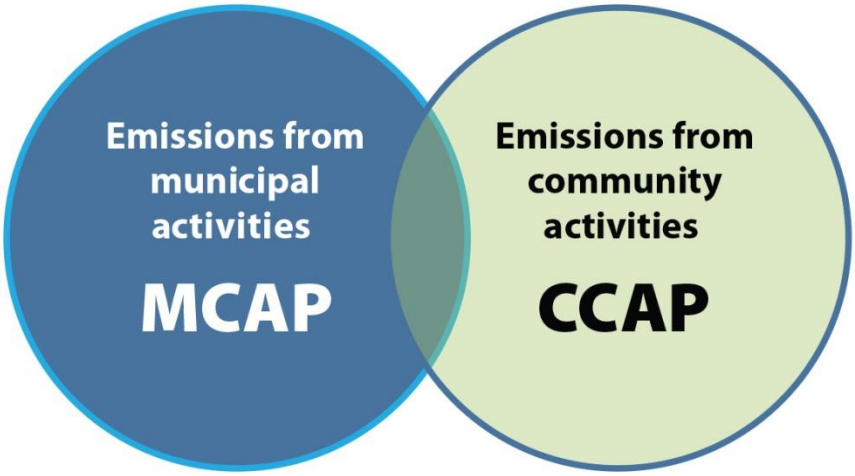


Figure 1-2. MCAP and CCAP Emissions Overlap

1.4 Background Information on Climate Change Science

The phenomenon known as the *greenhouse effect* keeps the atmosphere near Earth's surface warm enough for the successful habitation of humans and other life forms. The greenhouse effect is created by sunlight that passes through the atmosphere (Figure 1-3). Some of the sunlight striking Earth is absorbed and converted to heat, which warms the surface. The surface emits a portion of this heat as infrared radiation, some of which is re-emitted toward the surface by GHGs. Human activities that generate GHGs increase the amount of infrared radiation absorbed by the atmosphere, thus enhancing the greenhouse effect and amplifying the warming of Earth (Center for Climate and Energy Solutions 2011).

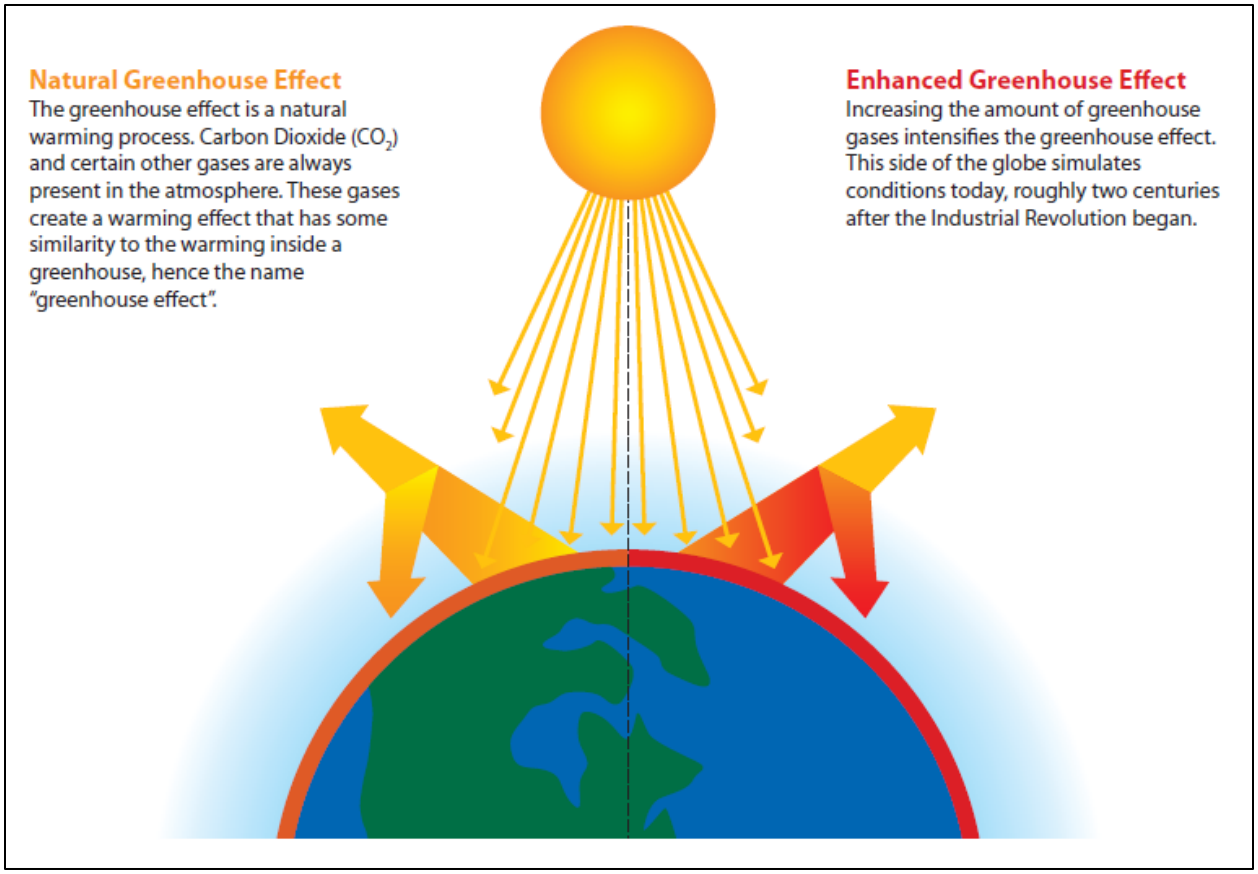

Natural Greenhouse Effect
The greenhouse effect is a natural warming process. Carbon Dioxide (CO_2) and certain other gases are always present in the atmosphere. These gases create a warming effect that has some similarity to the warming inside a greenhouse, hence the name "greenhouse effect".
Enhanced Greenhouse Effect
Increasing the amount of greenhouse gases intensifies the greenhouse effect. This side of the globe simulates conditions today, roughly two centuries after the Industrial Revolution began.

Figure 1-3. The Greenhouse Effect

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the Industrial Revolution. Rising atmospheric concentrations of GHGs in excess of natural levels result in increasing global surface temperatures—a phenomenon commonly referred to as *global warming*. Higher global surface temperatures in turn result in changes to Earth's climate system, including increased ocean temperature and acidity, reduced sea ice, variable precipitation, and increased frequency and intensity of extreme weather events (Intergovernmental Panel on Climate Change 2007a, 2007b). Large-scale changes to Earth's system are collectively referred to as *climate change*.

Climate Change and Global Warming

The terms *global warming* and *climate change* are often used synonymously, but they refer to two different processes. Increasing global surface temperatures as a result of rising atmospheric concentrations of GHGs, in excess of natural levels, is known as *global warming*. Large-scale changes to the Earth's system induced by higher global surface temperatures are collectively referred to as *climate change*.

Recent warming trends demonstrate a deviance from the natural pattern. Temperature data recorded by the U.S. Climate Divisional Database indicates that average annual temperatures in Los Angeles County have increased by 0.3 degrees F per decade between 1945 and 2012. Moreover, 8 of the last 10 years have been warmer than the average annual temperature over this same period (National Oceanic and Atmospheric Administration 2013).

While changes in global climate have been recorded throughout history, there is strong consensus among the scientific community that recent changes are the result of manmade GHG emissions. A recent study published in *Environmental Research Letters* indicates that 97% of climate scientists agree that human activity is "very likely" causing current global warming trends (Cook et al. 2013). Every national academy of science in the world likewise concurs that manmade GHG emissions are accelerating the magnitude and pace of climate change.

AB 32 identifies the following compounds as the major GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorinated carbons (PFCs), sulfur hexafluoride (SF_6), and hydrofluorocarbons (HFCs). Water vapor is not included in this list because natural concentrations and fluctuations far outweigh anthropogenic influence.[2]

Sources, Sinks, and Global Warming Potentials for Greenhouse Gases

Natural and human activities that generate GHGs are commonly referred to as emissions *sources*. The burning of fossil fuels to power buildings and vehicles is the primary source of CO_2 and a key contributor of CH_4 and N_2O emissions. A GHG *sink* removes and stores GHGs. For example, vegetation is a sink because it removes atmospheric CO_2 during respiration.

GHGs are not created equally. The Global Warming Potential, or GWP, is used to compare GHGs based on their potential to trap heat and remain in the atmosphere. Some gases can absorb more heat than others, and thus have a greater impact on global warming. For example, CO_2 is considered to have a GWP of 1, whereas N_2O has a GWP of 298. This means that N_2O is 298 times more powerful than CO_2.

1.5 Local Climate Change Effects and Public Health

1.5.1 Local Climate Change Effects

Large increases in global GHG concentrations could have substantial adverse effects on natural and human environments in the unincorporated areas. Current research efforts coordinated through the California Air Resources Board (CARB) and other State agencies examine the specific changes to California's climate that will occur as Earth's surface warms. California's *2012 Vulnerability and Adaptation Study*, the State's third major assessment on climate change, examines local and statewide vulnerabilities to climate change and includes new data and projections on climate changes in California (California Climate Change Center 2012). The University of California, Los Angeles (UCLA) (2012), in partnership with LARC, recently published several studies that develop climate change predictions that are specific to the greater Los Angeles area. These studies indicate that if GHG emissions continue to increase globally based on current trends, climate change could impact the natural environment in the following ways:

[2] Black carbon and its global warming potential is not addressed in this report. However, a black carbon global warming potential estimate was published this year, based on a major scientific assessment of the black carbon radiative forcing. See Bond et al. 2013 for additional information.

Increases in Ambient Temperatures: On average, the Los Angeles region is expected to warm 4 to 5 degrees over land by mid-century. The coasts and oceans will likely warm the slowest, whereas the mountains and deserts will experience more rapid warming. Warming across the region will be greatest in the summer and fall. For the unincorporated areas in particular, UCLA's high emissions modeling scenario predicts that mountain and inland areas may warm up to or greater than 4.5 degrees, and coastal and valley/urban areas warming up to 3.7 to 3.9 degrees (Sun et al. 2013).

Increases in Extreme Heat Conditions: Heat waves and very high temperatures could last longer and become more frequent. Extreme heat days are expected to triple in the coastal and central areas; the San Fernando Valley and San Gabriel Valley will witness almost a quadrupling of heat days. The number of extreme heat days in the desert and mountain areas will increase 5 to 6 times relative to the current amounts. For the unincorporated areas in particular, UCLA's high emissions modeling scenario predicts a nearly 12-fold increase in the number of heat days, down to a 1.5- to 2-fold increase for the inland/valley areas (Sun et al. 2013).

Decreased Snowfall and Winter Snowpack: The region's mountains could see a 42% reduction in annual snowfall by mid-century. The winter snowpack is also expected to melt 16 days earlier as a result of rising temperatures. As of March 2014, California is facing a severe drought and the snowpack in the Sierra Nevada is 12% of the annual average (California Department of Water Resources 2014). Changes in snowfall could exacerbate drought-like conditions, reducing water supplies and water security for all end users throughout the County.

Increased Frequency, Intensity, and Duration of Extreme Storms: Changes in storm events could create conditions that are conducive to air pollution formation, which further exacerbates air quality issues. Increased winter storm events could also affect peak stream flows and flooding.

Changes in Growing Season and Species Distribution: Changes in growing season conditions could cause variations in crop quality and yield. Plant and wildlife distributions may also be affected by changes in temperature, competition from colonizing species, regional hydrology, sea level, and other climate-related effects.

Rising Sea Levels: Sea levels are expected to steadily rise by mid-century, which could inundate portions of the coastline.

California's Cal-Adapt website presents several climate predictions for Los Angeles County, based on high and low scenarios of future GHG concentrations developed by Santa Clara University, the Scripps Institution of Oceanography, the Pacific Institute, the U.S. Geological Survey, and the University of California, Merced (Cal-Adapt n.d.). Regarding temperature predictions, the projected difference in temperature between the baseline time period (1961 to 1990) and an end-of-century period (2070 to 2090) is +3.8°F (low emissions scenario) and +6.4°F (high emissions scenario). For sea level rise, the Los Angeles County coastal land area vulnerable to a 100-year flood event is projected to increase by 46% by 2100, though these coastal land areas appear largely located within cities. Wildfire projections include slight increases in the amount of area burned in 2085 compared to the current (2010) risk, primarily in the northern and eastern portions of the County.

1.5.2 Climate Change and Public Health

Changes in the local climate can have significant and far-reaching public health consequences throughout the unincorporated areas. Sensitive populations—such as children, the elderly, and people with illnesses—are typically the most vulnerable to climate change effects, due to preexisting health or socioeconomic conditions. For example, the California Department of Public Health Environmental Health Tracking Program's *ASTHO Climate Change Population Vulnerability Screening Tool* identifies elevated climate change risks in urbanized areas, particularly those areas with a high proportion of persons of color (California Department of Public Health n.d.).

Climate change has the potential to affect these and other population groups in direct and indirect ways. For example, increases in ambient temperature can lead to heat-related illnesses and death, whereas changes in disease vectors may lead to increased risk of infectious diseases. Climate change and air pollution are also closely coupled. Ozone and particulate pollution, both of which can negatively impact human health, are strongly influenced by weather and can be concentrated near Earth's surface during extreme heat events. Increased emergency response to address rising public health concerns from deteriorating air quality and other climate change impacts could strain community and economic resources. Specific to Los Angeles County, the *ASTHO Climate Change Population Vulnerability Screening Tool* highlights areas of elevated climate change risk along coastal areas of the County, largely from risks due to sea level rise, but also partially attributable to poor public transit, wildfire risk, and a large proportion of elderly living alone (California Department of Public Health n.d.).

Evidence indicates that climate change could affect public health and community well-being (Centers for Disease Control and Prevention 2010). Several of the climate change effects listed in Section 1.5.1 are summarized in Table 1-1, with corresponding projected public health impacts (California Department of Public Health 2012).

Although the actions outlined in the CCAP are designed to reduce GHG emissions and contribute to an overall state, national, and global effort to avoid the worst effects of climate change, many of the CCAP actions will also contribute to public health improvements and will result in a healthier and more sustainable way of living. For example, actions designed to reduce vehicle trips and improve the transportation network can also improve air quality by reducing vehicle congestion and fossil fuel combustion. An increase in active transport, such as walking and biking, can also increase physical activity and substantially lower the burden of disease (Maizlish et al. 2011). Similarly, actions to support local food systems will supplement healthy lifestyles throughout the community by improving access to nutritious and locally grown foods.

Table 1-1. Climate Change Effects and Potential Public Health Impacts

Climate Change Effect	Potential Public Health Impact

Increases in ambient temperatures	• Cardiovascular disease
	• Increased number and range of:
	  ○ Vector-borne disease, such as West Nile virus, malaria, Hantavirus, or plague
	  ○ Water-borne disease, such as cholera and E. coli
	  ○ Food-borne disease, such as salmonella poisoning
	  ○ Harmful algal blooms causing skin disease and poisoning
	  ○ Allergies caused by pollen and rashes from plants such as poison ivy or stinging nettle
	  ○ Vulnerability to wildfires and air pollution

Increases in extreme heat conditions	• Premature death • Cardiovascular stress and failure • Heat-related illnesses, such as heat stroke, heat exhaustion, and kidney stones
Increased frequency, intensity, and duration of extreme storms	• Population displacement, loss of home and livelihood • Death from drowning • Injuries • Damage to potable water, wastewater, and irrigation systems resulting in a decrease in the quality/quantity of water supply and disruption to agriculture • Water- and food-borne diseases from sewage overflow
Changes in growing season and species distribution	• Changing patterns and yields of crops, pests, and weed species, resulting in higher prices for food and food insecurity, hunger, and malnutrition • Changes in agriculture/forestry, leading to lost or displaced jobs and unemployment

The diverse public health benefits achieved by the combined implementation of the CCAP actions make climate action planning a mutually beneficial strategy for reducing GHG emissions and for improving community well-being.

1.6 Climate Change Regulations and Initiatives

Climate change is widely recognized as an imminent threat to the global climate, economy, and population. Federal regulations continue to evolve to address climate change. For example, President Obama's 2013 Climate Action Plan calls for future limits on GHG emissions from new and existing power plants. California has adopted official legislation (AB 32) to address various aspects of climate change and reduce statewide GHG emissions. AB 32 codified the State's GHG emissions target by requiring that statewide GHG emissions be reduced to 1990 levels by 2020. The AB 32 *Scoping Plan* identifies specific measures to achieve this goal and requires that CARB and other State agencies develop and enforce regulations and other programs for reducing GHGs. Many of the State regulations under AB 32 are aimed at large sources of emissions, such as stationary sources and transportation fuels. The AB 32 *Scoping Plan* also articulates an important

role for local governments in achieving the statewide target, recommending that they establish GHG reduction goals for both their municipal operations and the community, consistent with those of the state.

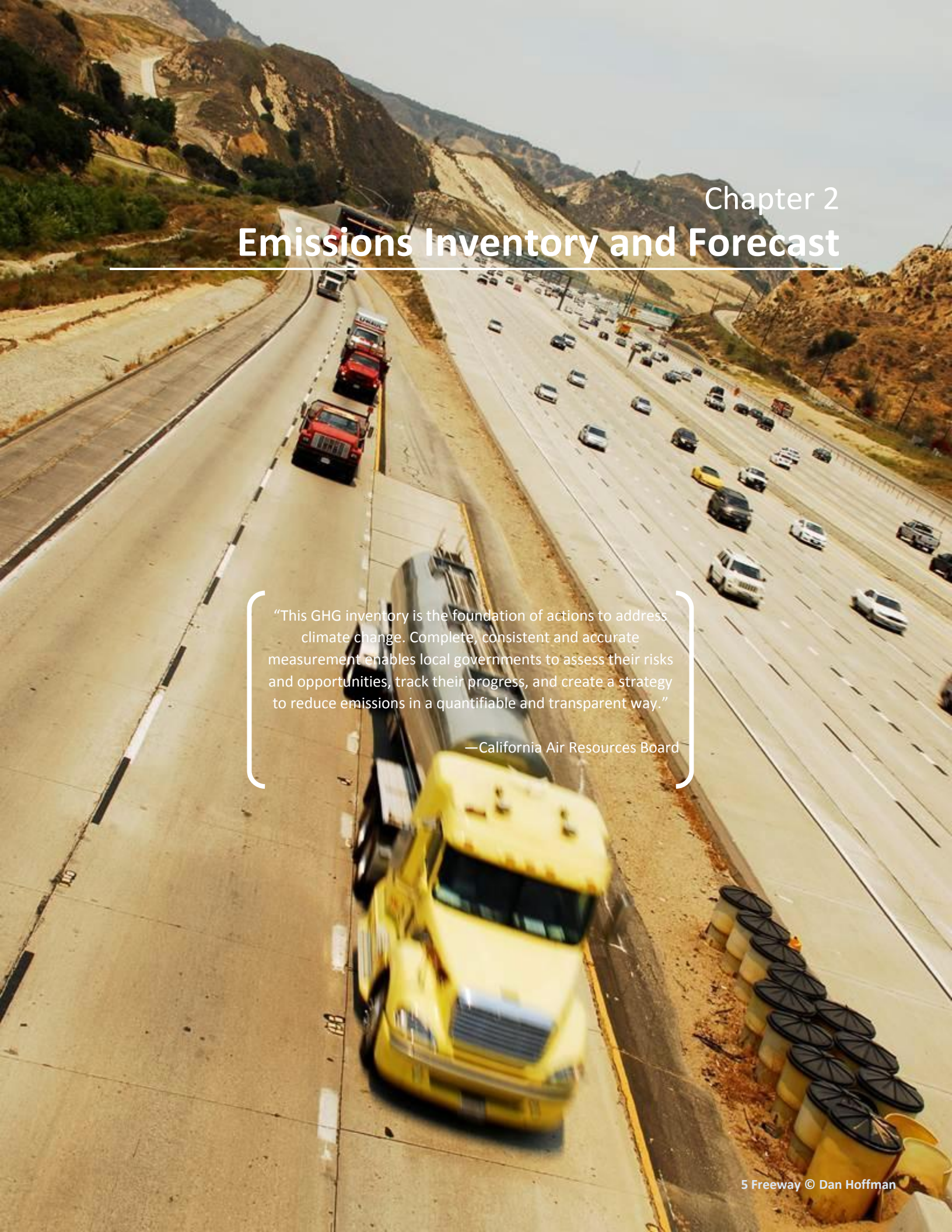
Please refer to Appendix A for additional information on climate change legislation at the federal, state, and regional levels relevant to the County's climate action planning efforts.

1.7 Climate Change Adaptation

The climate in Los Angeles County is already changing. The County recognizes that GHG concentrations in the atmosphere have already risen to a level at which some degree of future climate change will happen. Preparation for these climate changes (also called *climate change adaptation*) is therefore a fundamental component of the County's overall strategy to address climate change.

The County is comprehensively preparing for expected changes in the built and natural environments in Los Angeles as a result of climate change, with particular emphasis on how these expected changes may influence its own operations and the broader community within the unincorporated areas. The County's Chief Executive Office, in conjunction with Public Health, Public Works, Beaches and Harbors, Fire, Internal Services, and Regional Planning is evaluating future climate change scenarios in order to identify and develop climate preparedness strategies. One effort underway is the Los Angeles Basin Stormwater Conservation Study (LA Basin Study) to assess future water supply demands and challenges as a result of climate change. Another effort is the Soil Moisture Project, in which the Fire Department is reviewing its safety protocols and assessing potential increased fire risks. The results of the Soil Moisture Project will be used to advance tactical training for Fire Department personnel and to provide additional public safety education in the face of increasing temperatures and fire conditions.

Climate change preparedness continues to evolve as researchers develop methods to better predict local climate change effects and assess the effectiveness of various preparedness options. The CCAP complements existing climate change adaptation efforts and serves as an essential framework for the County's overall strategy to address climate change. Indeed, many of the CCAP actions have strong linkages to public health and climate change adaptation by reducing energy use during peak demand, reducing the urban heat island effect; increasing access to public transit; encouraging active modes of transportation; improving air quality; connecting public health and other agencies in the County to climate change and emergency planning resources; and encouraging public participation in climate change planning. Information gained through robust planning for climate change effects and GHG emission reduction will ultimately enable the County to make better decisions related to long-term community resiliency.



Chapter 2

Emissions Inventory and Forecast

"This GHG inventory is the foundation of actions to address climate change. Complete, consistent and accurate measurement enables local governments to assess their risks and opportunities, track their progress, and create a strategy to reduce emissions in a quantifiable and transparent way."

—California Air Resources Board

5 Freeway © Dan Hoffman

2.1 Introduction

The unincorporated areas comprise of more than 2,600 square miles and are home to over one million residents. These areas are economically, geographically, and socially diverse, which presents unique challenges and opportunities for robust climate action planning. The following is a discussion of 2010 GHG emissions (2010 inventory) and a projection of 2020 emissions (2020 forecast) for community activities within the unincorporated areas. The 2010 inventory and 2020 forecast provide a foundation for the CCAP actions, as well as long-term emissions monitoring.

2.2 Overview of Analysis

The 2010 inventory and 2020 forecast include GHG emissions associated with community activities within the unincorporated areas. The inventory also includes emissions that occur outside of the unincorporated areas, but only to the extent that such emissions are the result of community activities. For example, GHG emissions generated by regional power plants to provide electricity to local homes and businesses in the unincorporated areas are considered even though the power plants themselves may not be located within the unincorporated areas.

Estimating Building Energy Emissions

Here is a quick overview of how GHG emissions are estimated for the building energy sector:

Step 1: Determine which utilities supply electricity and natural gas to residents and businesses in the unincorporated areas.

Step 2: Obtain annual energy usage from the utilities. Electricity consumption is provided in terms of kilowatt-hours, whereas natural gas usage is provided in terms of therms.

Step 3: Multiply electricity and natural gas quantities by GHG emission factors.

Step 4: Add emissions from electricity and natural gas to determine total GHG emissions from building energy use.

Emissions generated by community activities were analyzed using widely accepted methodologies and procedures that are used by federal, state, and local air quality management and environmental agencies and that are consistent with the *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions* (ICLEI 2012). The 2010 inventory represents the existing emissions level, whereas the 2020 forecast is a prediction of how community emissions may change in the future, in the absence of most State and local actions to reduce GHGs. The 2020 forecast is based on expected growth in the unincorporated area population, employment, and households. Please refer to Appendix B for detailed information on methods and assumptions used to estimate emissions.

The 2010 inventory and 2020 forecast analyze GHG emissions from the following sectors:[3]

- **Building Energy**: Natural gas and electricity consumption from residential, commercial, and industrial buildings within the unincorporated areas.

[3] Note that GHG emissions were quantified in terms of MT CO_2e emitted per year, which accounts for the relative global warming potential of each GHG.

- **Transportation**: Fuel consumption from on-road and off-road vehicles operating within the unincorporated areas.
- **Water Conveyance and Wastewater Generation**: Electricity consumption associated with water importation, as well as process emissions from wastewater treatment for the unincorporated areas.
- **Waste Generation**: Methane emissions from waste generated by the community within the unincorporated areas.
- **Agricultural Activities**: Nitrogen oxide emissions from fertilizer application and methane emissions from manure management in the unincorporated areas.
- **Stationary Sources**: Fuel consumption from stationary sources located within the unincorporated areas (other than natural gas included in the building energy sector).

2.3 Community Emissions Inventory for 2010

Total GHG emissions generated by community activities occurring in the unincorporated areas in 2010 were 7,982,720 MT CO_2e, which is approximately 1.8% of California's GHG emissions in the same year.

As shown in Table 2-1 and Figure 2-1, building energy use represents the largest source of community emissions (49%) in 2010. Building energy is often one of the largest sources of GHG emissions in community inventories and includes residential, commercial, and industrial components. Transportation emissions are the second largest source of emissions, accounting for 42% of total emissions in the unincorporated areas. Similar to the building energy sector, transportation is typically a considerable component of a community's total GHG emissions, ranging from 30% to 70% depending on other sources and local conditions. The third largest source is waste generation, with a contribution of 7% of the total 2010 inventory. The remaining sources are water conveyance and wastewater generation (2%), agriculture (0.4%), and stationary sources (0.02%).

Table 2-1. 2010 GHG Inventory for Unincorporated LA County by Sector (MT CO_2e)

Sector	2010 Emissions (MT CO_2e)	Percent of Inventory
Building Energy	3,906,213	49%
Transportation	3,383,711	42%
Waste Generation	535,148	7%
Water Conveyance and Wastewater Generation	126,074	2%
Agriculture	30,290	<1%
Stationary Sources	1,283	<1%
Total	**7,982,720**	**100%**

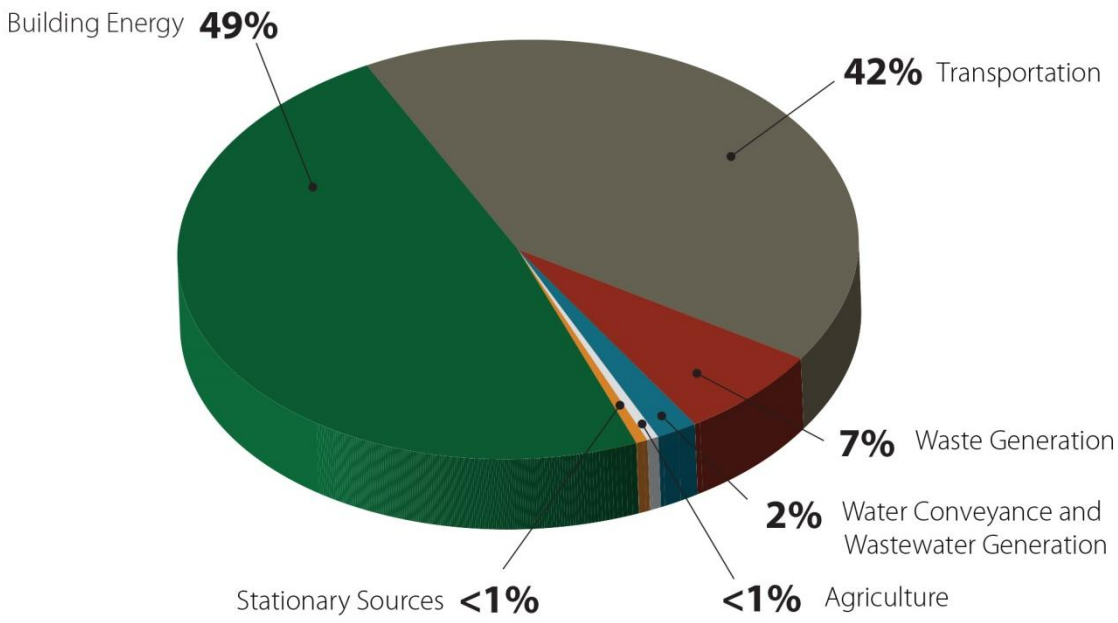


Figure 2-1. 2010 GHG Inventory for Unincorporated LA County by Sector (MT CO_2e)

2.4 Community Emissions Forecast for 2020

The 2020 forecast is a prediction of community emissions that would occur in 2020 without accounting for federal, state, and local actions designed to reduce GHG emissions. The forecast estimates future GHG emissions based on trends in population, households, and employment included in the Southern California Association of Governments' (SCAG) *2012Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS). These growth trends are similar to socioeconomic assumptions outlined in the County's General Plan.

Is the 2020 Forecast a BAU Projection?

A "business as usual" (BAU) projection is an estimate of future emissions; it does not include the effects of *any* new federal, state, or local measures. The CCAP 2020 forecast is similar to a BAU projection but differs slightly because: 1) the data used to forecast 2020 emissions includes General Plan socioeconomic assumptions; 2) the transportation emissions forecast accounts for future planned highway and transit network improvements; and 3) the building energy sector assumes power generated by the recently closed San Onofre nuclear facility will be replaced by 50% renewable and 50% natural gas sources in the future. Local actions and all other State regulations (e.g., AB 32) are not included in the forecast. Please refer to Appendix B for additional information on this topic.

Table 2-2 summarizes the 2020 forecast of GHG emissions for community activities in the unincorporated areas and compares the results to the 2010 inventory. Table 2-2 also shows that GHG emissions are expected to increase by approximately 1 million metric tons (13%) from 2010 to 2020. This growth will occur primarily due to increases in vehicle trips, building energy use, and off-road equipment. As the unincorporated areas grow, transportation activity and energy consumption will increase. Likewise, off-road equipment emissions will increase as a result of increased development and construction activity.

Assumptions for Southern California Edison's future power generation mix also contribute to the forecasted increase in building energy emissions (please refer to Appendix B for additional information).

GHG emissions from waste generation and agriculture activities are expected to slightly decrease relative to the 2010 inventory. Reductions in waste-related emissions are predominantly a result of improvements in methane capture rate at regional landfills. The decline in agriculture emissions is a result of expected reductions in overall agricultural activity. Despite these changes, the overall emissions profile for the 2020 forecast is similar to the 2010 inventory, with building energy, transportation, and waste generation representing the top three sources of emissions (see Figure 2-2).

Table 2-2. Summary of the 2020 GHG Forecast for Unincorporated LA County and Comparison to the 2010 Inventory (MT CO_2e)

Sector	2020 Emissions	Change from 2010
Building Energy	4,708,344	802,131
Transportation	3,684,329	300,618
Waste Generation	500,952	-34,196
Water Conveyance and Wastewater Generation	130,314	4,239
Agriculture	30,141	-149
Stationary Sources	1,390	107
Total	**9,055,469**	**1,072,750**

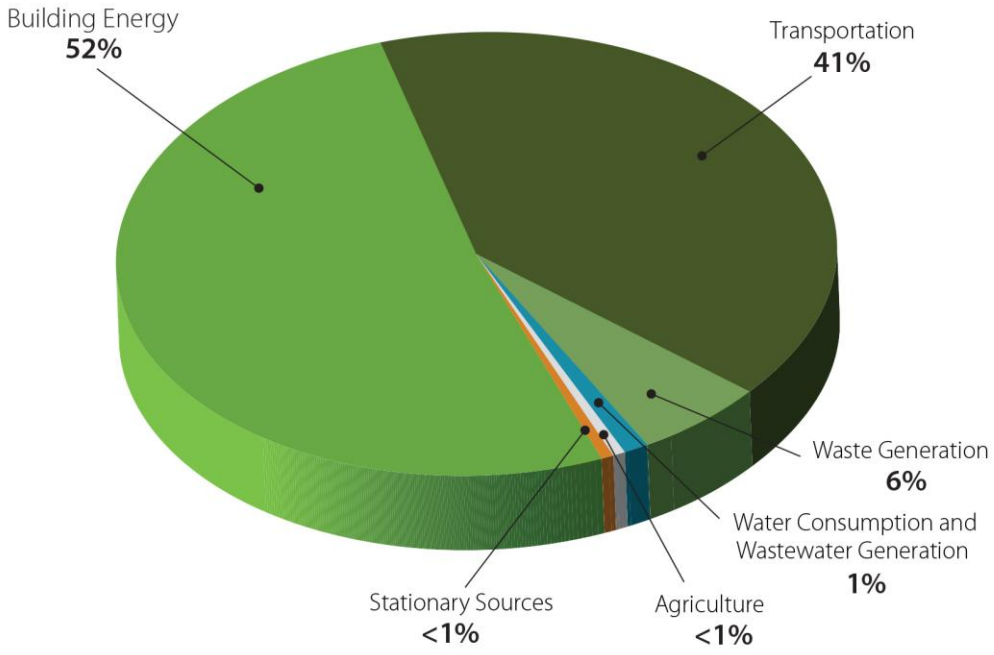


Figure 2-2. 2020 GHG Forecast for Unincorporated LA County by Sector (MT CO_2e)

Chapter 3

GHG Emissions Reduction Target for 2020

> "Local governments have important roles to play in efforts to reduce greenhouse gas emissions. Local governments are at the forefront of efforts to adapt to the ongoing and anticipated impacts of climate change."
>
> —Office of the California Governor

Castaic Hydroelectric Plant © Randal Ferman, PE (Ekwestrel Corp)

3.1 Introduction

This section includes a discussion of the County's GHG emissions reduction target. This target is consistent with statewide reductions required under AB 32 and relies in large part upon the statewide reduction strategies anticipated under AB 32. In evaluating its statewide reduction goal, CARB's modeling concluded that California could meet the ambitious AB 32 target while maintaining and enhancing economic growth (California Air Resources Board 2008a). Furthermore, CARB identifies public health benefits as a result of the AB 32 *Scoping Plan*, including reduced premature death, incidences of asthma, lower respiratory symptoms, and work loss days (California Air Resources Board 2008b).

3.2 Emissions Reduction Target

The County's GHG emissions reduction target of *at least 11% below 2010 levels by 2020* is consistent with statewide reductions under AB 32.

California's AB 32, the *Global Warming Solutions Act* of 2006, commits to reducing the statewide GHG emissions to 1990 levels by 2020. The CARB AB 32 *Scoping Plan* (2008c) provides a roadmap for achieving these reductions and for meeting this statewide reduction target. Furthermore, the AB 32 *Scoping Plan* states (pp. 27):

> …[C]ARB encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020.

In the AB 32 *Scoping Plan*, CARB equates the statewide goal of achieving 1990 emissions levels by 2020 with the goal of reducing "current" emissions levels 15% by 2020. The AB 32 *Scoping Plan* was benchmarked on estimated 2005 to 2008 levels (using estimated emissions for these years only) when CARB recommended the 15% reduction.[4]

CARB released the latest update of the State's GHG inventory in August 2013, providing updated GHG emissions data through 2010. This update shows different inventory levels than those estimated in the AB 32 *Scoping Plan*. Specifically, the updated 2005 to 2008 emissions are considerably lower than the straight-line forecast that used older emissions data from the AB 32 *Scoping Plan* released in 2008. This trend in the emissions data suggests that a smaller percent reduction (i.e., a 10% to 11% reduction) from 2005 to 2008 levels is needed to achieve the 2020 target (than anticipated in the AB 32 *Scoping Plan*). Table 3-1 shows a comparison of the California AB 32 *Scoping Plan* and 2013 inventory statewide data update. For both datasets, Table

[4] At the time of the AB 32 *Scoping Plan* release in 2008, the statewide GHG inventory was only completed through 2004. The emissions for 2005 to 2008 were therefore forecasted using the prior years' inventory data and the 2020 forecast. Those forecasts for 2005 to 2008 showed that the State would need to reduce emissions by 12% to 16% below 2005 to 2008 levels to reach 1990 levels.

3-1 also shows the percent reduction needed to meet 1990 levels from each inventory year. In this table, the 2008 AB 32 *Scoping Plan* data for 2005 to 2008 is based on a *projection* from 2004 to 2020. The 2013 inventory data for 2005 to 2008 is based on the *actual* emissions inventory data for those years.

Table 3-1. California Emissions and Reductions to 1990

Year	Gross Emissions (MMT CO_2e)		Reduction to 1990	
	California 2008 AB 32 Scoping Plan	California 2013 Inventory	California 2008 Scoping Plan	California 2013 Inventory
1990	433.29	433.29	0%	0%
2000	457.29	462.90	5%	6%
2001	473.49	478.36	8%	9%
2002	468.54	475.82	8%	9%
2003	467.42	479.08	7%	10%
2004	484.40	489.18	11%	11%
2005	*491.40*	482.09	12%	10%
2006	*498.40*	479.18	13%	10%
2007	*505.40*	485.54	14%	11%
2008	*512.40*	483.22	15%	10%
2009	–	454.69	–	5%
2010	–	449.59	–	4%

Note: MMT = million metric tons

As shown in Table 3-1, actual statewide GHG emissions for 2009 and 2010 were significantly less than 2000 to 2008 levels due to the effects of the recent economic downturn in the U.S. It is likely that emissions in Los Angeles County were also affected by the economic downturn. Table 3-1 shows that a reduction target of 4% below 2010 levels achieves the statewide emissions level for 1990, which suggests that a local government could adopt 4% below 2010 levels as a reduction target and match the effort needed to meet AB 32 at the State level. The County instead conducted an analysis to identify a local reduction target from 2010 levels that would be equivalent to the reduction percentages needed at the State level from 2005 to 2008 (pre-recession) levels (i.e., a 10% to 11% reduction from 2010 levels).

To evaluate the reduction percentage, a "back-cast" of emissions was developed for the unincorporated areas for the years 2005 to 2008. The "back-cast" was performed by scaling 2010 emissions for each inventory sector by an appropriate socioeconomic factor for the unincorporated areas to approximate past emissions. As shown in Table 3-2, emissions for the unincorporated areas would need to be reduced by slightly more than 10% below 2010 emissions to be equivalent to a 10% to 11% reduction from estimated 2005 to 2008 emissions, using the same years as the "current" years in the AB 32 *Scoping Plan*, upon which the State's recommendation for local jurisdictions is based. While a 10% reduction could be argued to be consistent with the AB 32 *Scoping Plan* recommendation, the County is instead proposing a goal of 11% (as a minimum percentage) below 2010 levels for two reasons: 1) in order to be consistent with the percentage reduction needed at State levels from 2005 to 2008; and 2) in order to account for potential uncertainty in the prediction of the "back-cast."

Table 3-2. Los Angeles County Back-Cast Emissions and Reductions to Be Consistent with AB 32

Year	Estimated Gross Emissions (MMT CO_2e)	Reductions Based on 2013 State Inventory	Target Emissions for LA County
2005	8.10 (back-cast)	10% (Table 3-1)	7.28
2006	8.18 (back-cast)	10% (Table 3-1)	7.40
2007	8.17 (back-cast)	11% (Table 3-1)	7.30
2008	8.14 (back-cast)	10% (Table 3-1)	7.30
2009	8.00 (back-cast)	-	7.62
2010	7.98 (County inventory)	**11% (Proposed)**	**7.10**

Note: MMT = million metric tons

3.3 Meeting the Emissions Reduction Target

Together, the local community and statewide actions described in the County's CCAP (Chapter 4) would reduce 2020 GHG emissions within the unincorporated areas by more than 1.9 million MT CO_2e. As shown in Table 3-3 and Figure 3-1, approximately 80% and 20% of the GHG reductions achieved by the CCAP are attributed to State- and community-level programs (rows D and E in Table 3-3), respectively. The combined effect of State and local actions provides sufficient emissions reductions to exceed the County's GHG target by about 4,700 MT CO_2e. Actions not currently quantified will likely contribute additional reductions to the County's goal.

Table 3-3. Summary of State and Local GHG Reductions (MT CO_2e)

Parameter	GHG Emissions (MT CO_2e)
Unincorporated LA County 2020 Forecast	9,055,469
Target for 2020—at least 11% below 2010 levels	7,104,621
$Total_1$ *Reductions Needed to Reach Interim Target (2020 forecast minus 2020 target)*	*1,950,849*
Total Reductions from State level actions (Table 4-3)	1,571,526
Total Reductions from local programs (Table 4-1)	384,045
$Total_2$ *GHG Reductions Achieved by the CCAP (State plus local reductions)*	*1,955,570*
Exceeds Reduction Target by ($Total_2$ minus $Total_1$)	4,722

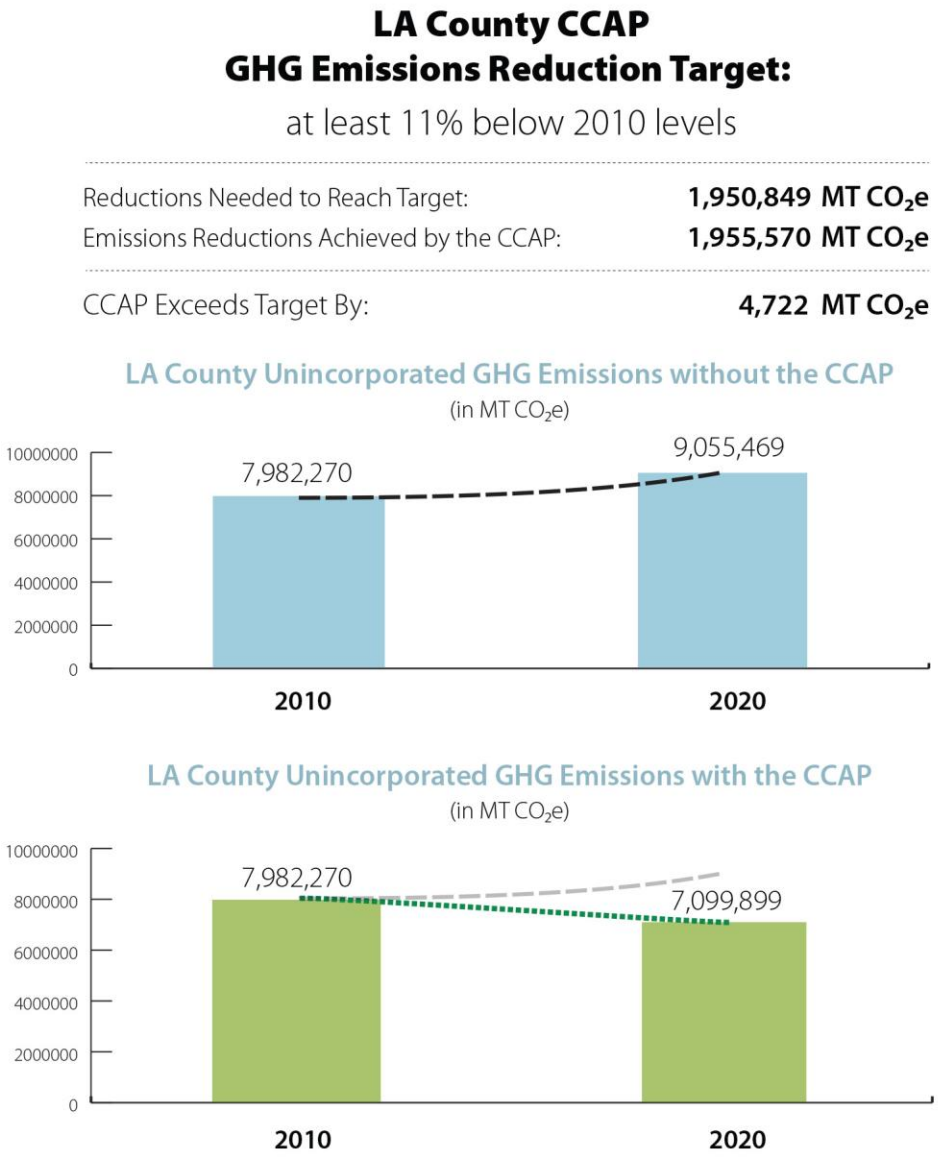


Figure 3-1. Summary of State and Local GHG Reductions (MT CO_2e)

Emissions Reductions in Context

Implementation of the CCAP would avoid the generation of more than 1.9 million MT CO_2e, which is equivalent to the following actions in 2020 (U.S. Environmental Protection Agency 2013):

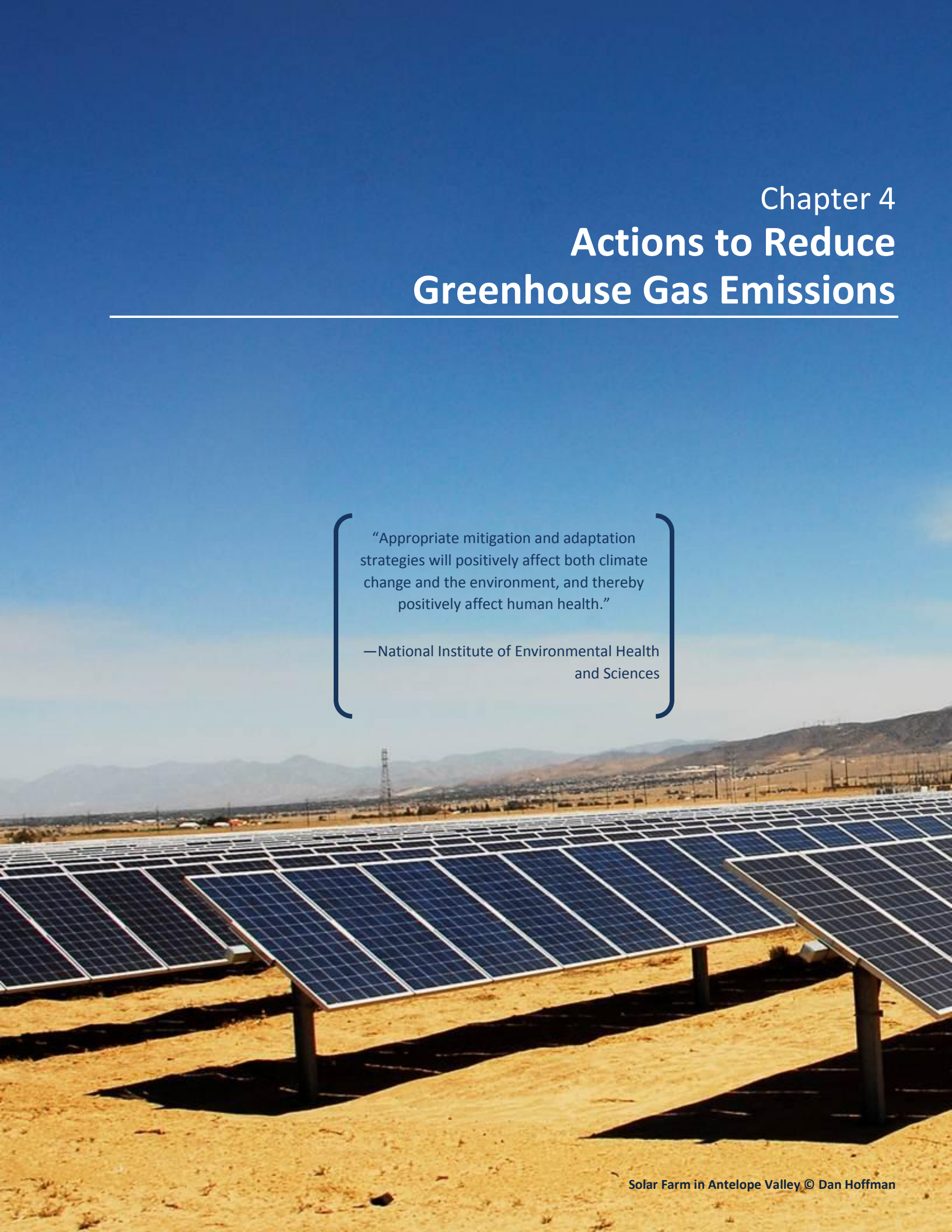
- Removing more than 410,000 passenger vehicles from the road.
- Reducing gasoline consumption by more than 220 million gallons.
- Providing renewable energy to power over 178,000 homes.

Chapter 4

Actions to Reduce Greenhouse Gas Emissions

"Appropriate mitigation and adaptation strategies will positively affect both climate change and the environment, and thereby positively affect human health."

—National Institute of Environmental Health and Sciences



Solar Farm in Antelope Valley © Dan Hoffman

4.1 Introduction

Implementing the CCAP will reduce future communitywide GHG emissions in the unincorporated areas in a manner that is consistent with statewide goals outlined under AB 32. The following sections describe State and local actions to reduce GHG emissions, summarize anticipated emissions reductions, and present the results of a cost-benefit analysis. Please refer to Appendix C for detailed information on individual actions.

4.2 The CCAP Framework

4.2.1 CCAP Actions

The CCAP comprises a variety of State and local actions to reduce GHG emissions within the unincorporated areas. Statewide efforts to reduce GHG emissions are a fundamental part of the County's CCAP. For example, the State's Renewables Portfolio Standard (RPS) will reduce the carbon content of electricity throughout the state, including in Los Angeles County. Electricity provided to the County will therefore be cleaner and less GHG intensive than if the RPS had not been established. The CCAP includes the local impact of five State actions to reduce GHG emissions, as discussed further in Section 4.5.

The County has identified 26 local actions to supplement the statewide initiatives. Although identified individually in the CCAP, these actions will be implemented together as part of a comprehensive GHG emissions reduction program. Coordinating GHG reduction programs will streamline CCAP implementation and potentially boost GHG reduction outcomes through synergies created among measures.

The majority of the 26 local actions include voluntary, incentive-based programs that will reduce emissions from both existing and new development in the County. Several other actions will be implemented by the County or other agencies within the region. A small subset of actions will establish mandates for development, either pursuant to State regulations or through existing County programs. Together, the CCAP actions will improve building energy efficiency and renewable energy production, increase alternative modes of transportation, enhance open spaces, and reduce water consumption and waste generation. The actions were selected following a comprehensive review of candidate strategies recommended by the California Attorney General, California Air Pollution Control Officers Association (CAPCOA), existing CAPs throughout California, and the General Plan. Appendix D includes a cross-reference of the CCAP actions to General Plan policies and other existing County programs.

A number of the actions build on existing County programs, whereas others provide new opportunities to address climate change. Successful implementation of these actions will require commitment and dedication from the County, its various departments, and its residents. As discussed in Chapter 5, the County will adaptively manage the implementation of the CCAP to maximize GHG reductions and operational efficiency for each action. Accordingly, the County may revise actions or add new actions to ensure that the County achieves its GHG reduction target for the unincorporated areas (see Chapter 3). If adopted and implemented prior to 2020, new federal

programs that achieve local GHG reductions beyond State and local mandates may also be added to the County's CCAP.

The County will develop and lead the implementation of the majority of the 26 local actions. However, for a few of the CCAP actions, another local agency, such as operators of wastewater treatment facilities, will have primary responsibility for measure development. The County anticipates supporting the lead entities for these actions, as needed, to identify targets and other strategies for implementation. Despite the County's supporting role, these actions are considered a critical component of a comprehensive CCAP, as many the actions build upon and expand existing programs. Please refer to Chapter 5 and Appendix C for additional information on lead entities for each action.

4.2.2 Community Co-Benefits

The CCAP will reduce GHG emissions within the unincorporated areas and will provide a vehicle for addressing climate change. Private residents, businesses, utilities, and other public sector agencies will incur some costs to implement and achieve the GHG reduction measures in the CCAP. In some cases, these entities will also realize long-term savings that can help recoup their initial investments. Indeed, some of the most cost-effective actions—with the biggest GHG reductions—can be found in the building energy sector, with several energy efficiency investments able to recoup initial costs in one to five years.

In addition to cost savings, implementing the CCAP will result in environmental and community benefits that supplement the expected GHG emission reductions. For example, many of the actions will reduce criteria air pollutants in the unincorporated areas, including ozone, carbon monoxide, and fine particulates, which will improve public health. Measures to improve mobility and alternative modes of transportation will enhance walkability and mobility throughout the community. Active transport, like walking and biking, has been shown to substantially lower the burden of disease. These strategies can also complement and encourage other, more sustainable modes of transportation, including public transit (Maizlish et al. 2011).

Several actions directly target resource efficiency within the unincorporated areas. Building energy and transportation actions will reduce electricity, natural gas, and gasoline usage, which may help lessen consumer sensitivity to increases in future energy prices. Reducing gasoline consumption has an additional benefit of reducing dependence on foreign oil supplies. Recycling and waste diversion programs will also reduce material consumption and the need for landfill space. Water efficiency improvements and land use measures will conserve natural resources and the long-term viability of

the County's natural spaces. Open spaces may also offer aesthetic and recreational benefits for community members, as well as habitat for native wildlife and plants.

The combined implementation of the CCAP actions provides an opportunity to lower carbon emissions and achieve a diverse suite of community co-benefits. Section 4.3 provides additional information on the relevant co-benefits for each CCAP strategy area.

4.3 Strategy Areas to Reduce Greenhouse Gases

The 26 local community actions to reduce GHG emissions from the County's community activities are grouped into the following five strategy areas. These strategy areas align with the County's primary emissions sources described in Chapter 2 and will provide targeted GHG reductions throughout the unincorporated areas.[5]

Green building and energy: Building energy consumption accounts for about 49% of the County's GHG inventory. The County has already developed and implemented a number of energy efficiency and renewable energy programs to reduce building energy related emissions. Additional strategies include expanding green building initiatives and popular efficiency programs that are not only cost-effective, but also deliver community co-benefits.

Land use and transportation: As a significant portion of the County's emissions are from on-road transportation sources, which is the case with most communities in the state, developing realistic ways to reduce vehicle trips and vehicle miles traveled (VMT), improve vehicle fuel economy, and reduce the carbon intensity of transportation fuels is an important strategy for the CCAP (Urban Land Institute 2007). Opportunities to address transportation-related emissions include changes in density and mixed use, increased transit, enhanced pedestrian and bicycle trails, and expanded incentives and opportunities for alternative modes of transportation and electric vehicle (EV) charging.

Water conservation and wastewater: Water conservation has been an important management objective for the County over the past several decades. Additional strategies to further reduce GHG emissions from community water consumption and wastewater generation focus on optimizing the operation of pumping infrastructure and expanding water conservation.

Waste reduction, reuse, and recycling: While waste production represents a small portion of the County's inventory, a number of cost-effective and relatively simple activities can be undertaken to increase the volume of waste that is either recycled or composted.

[5] Note that because agricultural emissions are minor components of the County's inventory (see Table 2-1), a specific strategy area for agricultural activities is not included in the CCAP. However, several land use and transportation and land conservation actions may have corresponding GHG reduction benefits in the agricultural sector.

Land conservation and tree planting: The unincorporated areas support a diversity of natural resources and habitats. Expanding and enhancing these areas not only contributes to GHG emissions reductions, but also provides recreational opportunities and a variety of other community co-benefits.

The following sections provide an overview of each of the five strategy areas, including the local actions, anticipated GHG reductions, co-benefits, and costs and savings. Please refer to Appendix C for specific details and goals of each local action.

Green Building and Energy
2020 Emissions Reduction
139,968
(MT CO_2e)
BE-1: Green Building Development
BE-2: Energy Efficiency Programs
BE-3: Solar Installations
BE-4: Alternative Renewable Energy Programs
BE-5: Wastewater Treatment Plant Biogas
BE-6: Energy Efficiency Retrofits of Wastewater Equipment
BE-7: Landfill Biogas
36%
% of Local Emissions Reduction
Upfront Costs: 75 to 818 million
Annual Net Savings: 12 to 55 million
Average Project Lifetime: 22 years

Residential and non-residential buildings within the unincorporated areas annually consume over 10,700 gigawatt-hours of electricity and 174 million therms of natural gas. Resources used to generate electricity, as well as the direct combustion of natural gas, emit more than 3.9 million MT CO_2e, making building energy use the largest source of community emissions (49%) in 2010. Increases in population and employment activity, coupled with rising temperatures and cooling demands, will continue to increase building energy use and associated GHG emissions unless prudent steps are taken to curb energy consumption.

Solar Water Heating

Your roof is prime real estate for reducing your impact to the climate in a variety of ways. Most people are familiar with solar energy being used to create electricity to power appliances, but there are other ways to harness the sun's energy. Solar water heating involves using solar collectors on your roof that heat up water to offset traditional, energy-intensive water heaters. Programs for rooftop solar, including solar hot water heating, are proposed as part of BE-3, *Solar Installations.*

Actions to address GHG emissions from building energy use are typically separated into two categories: energy efficiency and renewable energy. Energy efficiency measures reduce actual energy consumption through efficient design, whereas renewable energy measures reduce the carbon intensity of electricity generation. All building energy reduction measures have upfront costs, but they usually result in long-term cost savings through reduced utility bills. Building energy measures also achieve a diverse suite of community co-benefits, including reduced regional criteria pollutant emissions, improved home values, enhanced energy security, and job creation.

The County has identified seven actions to help reduce GHG emissions generated by building energy consumption. Two key actions, *BE-1: Green Building Development* and *BE-2: Energy Efficiency Programs*, focus on residential and nonresidential energy efficiency improvements in new and existing buildings. *BE-1: Green Building Development* encourages future development to voluntarily exceed the requirements of Title 24, California's Building Code, that are applicable at

the time new development is approved. The action will accelerate the County's energy efficiency efforts for new development and will provide regulatory incentives, as well as other support that can be leveraged during project implementation. Similar support will also be provided for homeowners and businesses through *BE-2: Energy Efficiency Programs*, which promotes efficiency retrofits of existing buildings.

Cool Roofs

Temperatures in Los Angeles County are expected to increase by 4° to 5° F, on average, by mid-century. For residents, increased temperatures mean more extreme heat days, higher energy bills, and poorer air quality. Cool roofs are designed to keep our homes, businesses, and communities cooler. Cool roofing products are competitively priced and they are no more difficult to install than an ordinary roof. By reducing internal air temperatures by 3 to 12° F, cool roofs can provide significant savings on your energy bills, while helping to lower ambient temperatures outside. More information about cool roof technology is available at www.coolroofs.org. Cool roofs are proposed as part of the Heat Island Mitigation Plan (BE-1).

The majority of GHG reductions in the building energy sector are achieved by actions to increase renewable energy generation in the unincorporated areas. *BE-3: Solar Installations* encourages existing and future development to voluntarily install solar photovoltaic systems, where economically and technically appropriate. The action supports project developers and current property owners by promoting low-interest financing and streamlining regulatory procedures related to renewable energy installations. *BE-4: Alternative Renewable Energy Programs* complements *BE-3: Solar Installations* by exploring opportunities to expand wind, geothermal, and hydropower resources throughout the County. Developing these resources will diversify the County's electricity portfolio and improve the flexibility and resiliency of power delivery.

Additional actions included in the County's CCAP that will contribute to future GHG reductions in the building energy sector, but have not yet been quantified, include efficiency retrofits at regional wastewater treatment plants and landfills and increased support for renewable biogas projects. The County is not the lead implementation agency for these actions, but will work collaboratively to support these actions.

Vehicle trips made by residents and employees are expected to increase steadily as new housing units are developed, new businesses are created or expanded, and new services are provided. By 2020, GHG

emissions generated by transportation activities are expected to exceed 3.7 million MT CO_2e and represent about 41% of the 2020 forecast for the unincorporated areas. Actions to reduce VMT, improve vehicle fuel economy, and reduce the carbon intensity of transportation fuels are therefore essential to the County's GHG reduction strategy. These measures can also have far-reaching community co-benefits, including reduced formation of smog and toxic air containments. Alternative modes of transportation, such as walking and biking, may also help increase physical activity levels.

The County's land use and transportation strategy area includes a diverse set of 12 actions to reduce GHG emissions from on-road vehicles and off-road equipment (e.g., construction equipment). The actions recognize that an effective emissions reduction policy for the transportation sector must include strategies to improve mobility and access, while at the same time supporting overall transportation efficiency and new forms of travel. Accordingly, several of the land use and transportation actions promote an integrated, multi-modal transportation network that will support alternative forms of transportation. For example, *LUT-1: Bicycle Programs and Supporting Facilities* and *LUT-2: Pedestrian Network* provide incentives and programs to expand the County's bicycle and pedestrian network. *LUT-3: Transit Expansion* will create bus priority lanes and improve transit facilities and amenities. Other actions, such as *LUT-5: Car Sharing Program,* promote shared use of private and employer-owned vehicles. Together, these actions will reduce VMT and remove vehicles from the road, which can reduce congestion, vehicle delay, and vehicle idling and improve overall vehicle fuel economy.

Cool Pavements

Dark asphalt absorbs as much as 95% of the sun's heat, causing surrounding neighborhoods to heat up by as much as 2° to 6° F, which makes hot summer days even warmer. Cool pavements use lighter colored materials to reflect heat and can significantly reduce ambient air temperatures, while providing a number of co-benefits such as: improved air quality and lower energy demand for cooling. The reduced temperatures also help protect public health by reducing the risks of heat-related injuries and deaths, as well as improving visibility at night. Cool pavements are proposed as part of LUT-10, *Sustainable Pavements Program*.

In addition to supporting alternative transportation, a number of actions promote reduced vehicle travel and improvements to the existing efficiency of the transportation network. *LUT-4: Travel Demand Management* encourages ride-sharing programs and employer-sponsored vanpools to reduce peak-period vehicle trips. *LUT-6: Land Use Design and Density* directly targets land use patterns to support mobility and improve the diversity of urban and suburban developments. Finally, *LUT-7: Transportation Signal Synchronization Program* (TSSP), *LUT-10: Efficient Goods Movement,* and *LUT-11: Sustainable Pavements Program* include County efforts to improve the efficiency of existing roadways and transportation infrastructure.

Bicycle Programs

Bicycling is growing in popularity throughout the Los Angeles region. With nearly year-round sunshine, using a bike to replace short trips is a great way for people to reduce pollution and greenhouse gas emissions. According to AAA of Southern California, half of all car trips are shorter than 3 miles and 40 percent are less than 2 miles. Next time you are heading out for a quick errand, consider taking the bike instead. For resources and information on bicycling see www.la-bike.org. Additional bike programs are proposed as part of LUT-1, *Bicycle Programs and Supporting Facilities*.

Finally, the land use and transportation strategy area includes one action to improve the overall carbon intensity of the transportation sector. Specifically, LUT-8: *Electric Vehicle Infrastructure* promotes electric vehicles, which are less carbon intensive per vehicle mile than traditional gasoline-powered cars.

Specific strategies to reduce GHG emissions generated by off-road equipment are also included in the CCAP. These actions establish idling and electrification goals for heavy-duty construction equipment and incentive programs for electric landscaping equipment.

Water Conservation and Wastewater
2020 Emissions Reduction
101,675
(MT CO_2e)
WAW-1: Per Capita Water Use Reduction Goal
WAW-2: Recycled Water Use, Water Supply Improvement Programs, and Stormwater Runoff
26%
% of Local Emissions Reduction*
Upfront Costs: Not quantified
Annual Net Savings: Not quantified
Average Project Lifetime: Not quantified
* 85% of these reductions will occur in the Building Energy sector as a result of reduced electricity and natural gas consumption for hot water heating

The water conveyance and wastewater generation strategy represents about 2% of the County's GHG inventory. Water treatment and distribution also result in emissions, but are included in the building energy sector for accounting purposes. Although it is a relatively small component of the County's GHG portfolio, homes and businesses throughout the County consume a significant amount of water through indoor plumbing and outdoor irrigation. It is estimated that an average three-bedroom home uses 174,000 gallons of water each year. Given the arid climate in Southern California, as well as the potential for further reductions in water supplies as a result of climate change, conserving water for future generations is a critical strategy area for the CCAP.

Water Conservation Strategies

There are several easy ways to reduce water use in your home. Upgrading your landscape and irrigation is one way that will conserve outdoor water and reduce your monthly expenses. You can replace grass with plants that thrive in dry conditions or add mulch with drip irrigation or micro-sprinklers. Fixing water leaks is also an important way to conserve indoor water. As a homeowner or renter, the best way to determine if you have a leak is to turn off all taps and see if the dials still turn on your water meter. Finally, greywater systems can also reduce potable water demand. These systems capture everything except your toilet and kitchen water and reuse the captured water for irrigation outside the home. Find out ways to reduce your water consumption at http://www.bewaterwise.com/.

The County has identified two actions to enhance community water conservation and management. Water conservation efforts can greatly decrease the demand for available water. Accordingly, *WAW-1: Per Capita Water Use Reduction Goal* and *WAW-2: Recycled Water Use, Water Supply Improvement Programs, and Stormwater Runoff* will simultaneously help reduce GHG emissions and contribute to the adaptive capacity of the water system. Specifically, *WAW-1: Per Capita Water Use Reduction Goal* outlines strategies to help reduce water consumption consistent with Senate Bill (SB) X7-7. SB X7-7 requires urban water agencies throughout California to help achieve the statewide goal of a 20% per

capita water use reduction by 2020. *WAW-1: Per Capita Water Use Reduction Goal* identifies a variety of strategies that the County, in conjunction with local urban water agencies, will implement to promote water conservation throughout the unincorporated areas. These strategies range from water efficiency retrofits to "smart gardening" campaigns to reduce outdoor water use. *WAW-2: Recycled Water Use, Water Supply Improvement Programs, and Stormwater Runoff* will complement per capita water reduction efforts by promoting recycled water and policies to better manage stormwater to protect local groundwater supplies.

Each year, residents and businesses in the unincorporated areas generate more than 755,000 tons of waste. The County has established a comprehensive collection system that is designed to reduce the amount of trash sent to regional landfills. These programs collectively divert more than 50% of waste generated to recycling centers and other end uses.

For the County's unincorporated areas, the County intends to adopt a waste diversion goal to comply with all state mandates associated with diverting from landfill disposal at least 75% of the waste by 2020. The County recognizes that residents and business will play a vital role in achieving this goal. Accordingly, *SW-1: Waste Diversion Goal* outlines a number of local recycling and composting initiatives that the County will implement in conjunction with waste service providers throughout the community. Increased outreach and education are important tools that the County will utilize to help optimize participation in recycling and diversion programs. Together, the strategies identified under *SW-1: Waste Diversion Goal* will enable the County to achieve its waste reduction goal and support statewide efforts to reduce landfilled waste under Assembly Bill 341.[6]

[6] Assembly Bill 341 (Commercial Recycling) sets a statewide goal of 75% from source reduction, recycling, and composting.

Land Conservation and Tree Planting
2020 Emissions Reduction
1,126
(MT CO_2e)
LC-1: Develop Urban Forests
LC-2: Create New Vegetated Open Space
LC-3: Promote the Sale of Locally Grown Foods and/or Products
LC-4: Protect Conservation Areas
<1%
% of Local Emissions Reduction
Upfront Costs: 32 to 45 million*
Annual Net Costs: 6 to 17 million*
Average Project Lifetime: 40 years
*Analysis only reflects costs and savings associated with LC-1.

Natural communities and urban forests are dynamic ecosystems that provide environmental and aesthetic benefits. These areas help clean the air and water, strengthen the quality of place, reduce stormwater runoff, and create walkable communities. Natural communities and urban forests are generally considered *emissions sinks* because they sequester or remove atmospheric CO_2. The County has been actively involved in programs to increase and maintain existing natural areas. The CCAP builds on these programs through four key actions related to land conservation and tree planting.

The CCAP supports both protection of existing natural spaces and restoration and revegetation of previously disturbed areas. *LC-1: Develop Urban Forests* expands urban forests in the unincorporated areas by encouraging new trees to be planted in urban areas. *LC-2: Create New Vegetated Open Space* likewise promotes the restoration of previously settled land to increase carbon sequestration. The CCAP also includes measures to protect existing conservation areas, including oak woodlands, hillsides, and ridgelines. Other actions in the County's CCAP that will contribute to future GHG reductions include incentives for local farmers markets and additional protection of existing land conservation areas (*LC-3: Promote the Sale of Locally Grown Foods and/or Products* and *LC-4: Protect Conservation Areas)*.

4.4 Summary of Emissions Reductions and Cost Effectiveness by Action

The strategy areas discussed above provide a comprehensive approach to reduce GHG emissions generated by community activities in the unincorporated areas. Emissions reductions achieved by each of the 26 local actions included in the five strategy areas are summarized in Table 4-1. It is important to note that not all actions currently support a quantitative analysis of potential emissions reductions. Actions led by an entity other than the County are also not quantified or counted towards the County's GHG reduction target for 2020. Although these actions would reduce GHG emissions, the County is not solely responsible for the timing, nature, or complete funding of required improvements. Non-quantified actions are listed with an *estimated* GHG reduction potential of high, medium, or low. Despite this, these measures are still a vital part of the County's CCAP and ensure a comprehensive approach to GHG emissions reductions. Future implementation steps and monitoring of these actions may result in sufficient data to quantify the GHG reductions they achieve.

Table 4-1. Summary of Local Actions and Associated 2020 GHG Emissions Reductions

Strategy Area	Action		Goal Summary	2020 Emissions Reduction ($MT CO_2e$)[a]
Green Building and Energy	BE-1	Green Building Development	Promote and incentivize at least Tier 1 voluntary standards within CALGREEN for all new residential and nonresidential buildings. Develop a heat island reduction plan and facilitate green building development by removing regulatory and procedural barriers.	726
	BE-2	Energy Efficiency Programs	Energy efficiency retrofits for at least 25% of existing commercial buildings over 50,000 square feet and at least 5% of existing single family residential buildings.	46,298
	BE-3	Solar Installations	Promote and incentivize solar installations for new and existing homes, commercial buildings, carports and parking areas, water heaters, and warehouses.	92,944[b]
	BE-4	Alternative Renewable Energy Programs	Implement pilot projects for currently feasible wind, geothermal, and other forms of alternative renewable energy.[7]	Medium
	BE-5	Wastewater Treatment Plant Biogas	Encourage renewable biogas projects.	Low
	BE-6	Energy Efficiency Retrofits of Wastewater Equipment	Encourage the upgrade and replacement of wastewater treatment and pumping equipment.	Low
	BE-7	Landfill Biogas	Partner with the owners and operators of landfills with at least 250,000 tons of waste-in-place to identify incentives to capture and clean landfill gas to beneficially use the biogas to generate electricity, produce biofuels, or otherwise offset natural gas or other fossil fuels.	Medium

[7] Potential future forms of non-GHG energy could include nuclear fusion, which is being researched by many parties, including the Lockheed Martin Skunk Works in Palmdale, but which has not yet been experimentally proven as a viable commercial energy source. As new technologies become proven, the County will consider how they can support further development and deployment of such technologies.

Strategy Area	Action		Goal Summary	2020 Emissions Reduction (MT CO_2e)[a]
Land Use and Transportation	LUT-1	Bicycle Programs and Supporting Facilities	Construct and improve bicycle infrastructure to increase biking and bicyclist access to transit and transit stations/hubs. Increase bicycle parking and "end-of-trip" facilities.	7,774[c]
	LUT-2	Pedestrian Network	Construct and improve pedestrian infrastructure to increase walking and pedestrian access to transit and transit stations/hubs. Program the construction of pedestrian projects toward the goal of completing 15,000 linear feet of new pedestrian improvements/amenities per year.	3,924[c]
	LUT-3	Transit Expansion	Collaborate with the Los Angeles County Metropolitan Transportation Authority (Metro) on a transit program that prioritizes transit by creating bus priority lanes, improving transit facilities, reducing transit-passenger time, and providing bicycle parking near transit stations. Construct and improve bicycle, pedestrian and transit infrastructure to increase bicyclist and pedestrian access to transit and transit stations/hubs.	2,230
	LUT-4	Travel Demand Management	Encourage ride- and bike-sharing programs and employer-sponsored vanpools and shuttles. Encourage market-based bike sharing programs that support bicycle use around and between transit stations/hubs. Implement marketing strategies to publicize these programs and reduce commute trips.	9,416
	LUT-5	Car-Sharing Program	Implement a car-sharing program to allow people to have on-demand access to a shared fleet of vehicles.	2,223
	LUT-6	Land Use Design and Density	Promote sustainability in land use design, including diversity of urban and suburban developments.	27,956
	LUT-7	Transportation Signal Synchronization Program	Improve the network of traffic signals on the major streets throughout LA County.	72,499
	LUT-8	Electric Vehicle Infrastructure	Install 500 electric vehicle (EV) charging facilities at County-owned public venues (e.g., hospitals, beaches, stand-alone parking facilities, cultural institutions, and other facilities) and ensure that at least one-third of these charging stations will be available for visitor use.	2,682
	LUT-9	Idling Reduction Goal	Encourage idling limits of 3 minutes for heavy-duty construction equipment, as feasible within manufacturer's specifications.	360

Strategy Area	Action		Goal Summary	2020 Emissions Reduction (MT CO_2e)[a]
	LUT-10	Efficient Goods Movement	Support regional efforts to maximize the efficiency of the goods movement system throughout the unincorporated areas.	Low
	LUT-11	Sustainable Pavements Program	Reduce energy consumption and waste generation associated with pavement maintenance and rehabilitation.	Medium
	LUT-12	Electrify Construction and Landscaping Equipment	Utilize electric equipment wherever feasible for construction projects. Reduce the use of gas-powered landscaping equipment.	Low
Water Conservation and Wastewater	WAW-1	Per Capita Water Use Reduction Goal	Meet the State established per capita water use reduction goal, as identified by SB X7-7 for 2020.	101,651[d]
	WAW-2	Recycled Water Use, Water Supply Improvement Programs, and Storm Water Runoff	Promote the use of wastewater and gray water to be used for agricultural, industrial, and irrigation purposes. Manage stormwater, reduce potential treatment, and protect local groundwater supplies.	23[e]
Waste Reduction, Reuse, and Recycling	SW-1	Waste Diversion Goal	For the County's unincorporated areas, adopt a waste diversion goal to comply with all state mandates associated with diverting from landfill disposal at least 75% of the waste by 2020.	12,212
Land Conservation and Tree Planting	LC-1	Develop Urban Forests	Support and expand urban forest programs within the unincorporated areas.	1,126
	LC-2	Create New Vegetated Open Space	Restore and re-vegetate previously disturbed land and/or unused urban and suburban areas.	Low
	LC-3	Promote the Sale of Locally Grown Foods and/or Products	Establish local farmers markets and support locally grown food.	Low
	LC-4	Protect Conservation Areas	Encourage the protection of existing land conservation areas.	Low

Notes for Table 4-1.

a. Actions are evaluated based on their emissions reduction potential in 2020. Anticipated reductions for actions that currently do not support a quantitative analysis are qualitatively assessed as low, medium, or high based on the following emissions criteria.

Low = <1,000 MT CO_2e reduction

Medium = 1,000 to 100,000 MT CO_2e reduction

High = >100,000 MT CO_2e reduction

b. Emissions reductions assume implementation of solar PV; however, project applicants can install other solar technologies (e.g., solar thermal), as feasible, which may increase GHG reductions, relative to standard PV systems.

c. It is likely the addition of bicycle and pedestrian facilities will reduce shorter vehicle trips (i.e., less than 4 miles), rather than long-distance commutes. While many of these trips will likely be made on local roadways, it is speculative to assign a specific vehicle speed to the trip or assume that 100% of the trips would be made at lower speeds (e.g., less than 35 miles per hour). Accordingly, emissions reductions are conservatively calculated using an aggregate emission factor for all vehicle speeds (0 to 75 miles per hour). For reference, if all VMT reductions associated with LUT-1 and LUT-2 occurred at speeds less than 35 miles per hour, an additional 2,430 and 1,226 MT CO_2e, respectively, would be achieved, relative to the reductions presented in Table 4-1.

d. Water efficiency improvements will reduce water consumption, which will likewise contribute to reductions in building energy use. For example, efficient faucets that use less water will require less electricity and natural gas for hot water heating. Approximately 85% (86,371 MT CO_2e) of the GHG reductions achieved by WAW-1 are associated with reduced hot water heating. The remaining reductions (15,280 MT CO_2e) are related to reduction in energy use required to transport, distribute, and treat water.

e. Analysis currently included recycled water benefits from the Rimgrove and Pathfinder projects. Additional reductions are expected from other projects and activities implemented under this action prior to 2020.

Please refer to Appendix C for additional information on the individual actions, including goals and supporting policies.

For actions with quantified GHG reductions, costs and savings directly associated with the implementation of each local community action were estimated and attributed to the residents and businesses within the unincorporated areas. Costs and savings associated with actions that do not currently support a quantitative analysis are assessed qualitatively. Table 4-2 summarizes the estimated costs and savings for the private sector (e.g., residents and businesses), as available. The table also summarizes the anticipated community co-benefits associated with the primary CCAP strategy areas.

Cost-Effectiveness Terms Explained

Cost per MT CO_2e: Represents the net present value of each measure annualized over its lifetime, and then divided by the tons of CO_2e reduction that each measure is expected to achieve in 2020. This value adjusts for the significant variation in the lifetime of individual GHG reduction measures (e.g., from energy-efficient household appliances that last 10 years to solar panels that could last up to 25 years), as well as variations in capital costs and annual cost savings.

Simple payback period: The simple payback period represents the estimated number of years before the initial investment is repaid. It is estimated by dividing the total initial capital cost by the annual cost savings.

Net present value: Net present value (NPV) gives the net value of the measure in present value terms (i.e., discounted over the lifetime of the measure). A positive NPV indicates that a measure is cost-saving over its lifetime.

Table 4-2. Summary of Costs, Savings, and Benefits Associated with Local GHG Reduction Actions

Strategy Area	Action		Cost/MT CO_2e	Measure Lifetime	Simple Payback (Years)	Net Present Value	Co-Benefits
Green Building and Energy	BE-1	Green Building Development	-$48 to $38[b]	20	11 to 14	-$0.4 million to $0.3 million[b]	
	BE-2	Energy Efficiency Programs	$60 to $215	18	4 to 10	$33 million to $117 million	
	BE-3	Solar Installations—Direct Purchase[a]	-$105 to $103[c]	25	10 to 17	-$132 million to $137 million[c]	
		Solar Installations—PPA	-$55 to $39[c]	25	NA	-$72 million to $52 million[c]	
	BE-4	Alternative Renewable Energy Programs	Not estimated. Costs may include upfront capital costs for construction, fixed and variable operations and maintenance costs, and financing costs. Costs may be offset by the value of the electricity generated.				
	BE-5	Wastewater Treatment Plant Biogas	Not estimated. Upfront costs to purchase and install methane capture and prime mover systems could range from approximately $2,000/kilowatt (kW) to $5,500/kW, with annual maintenance costs ranging from $0.01 to $0.03/kilowatt-hour. Savings may be associated with avoided energy costs.				
	BE-6	Energy Efficiency Retrofits of Wastewater Equipment	Not estimated. Capital costs could cover a variety of processes that can be upgraded to improve energy efficiency, such as the installation of variable frequency drives and high efficiency pumps and motors, and the use of more efficient blowers and air diffusers to reduce the energy demands of aeration systems. Savings may be associated with avoided energy costs.				
	BE-7	Landfill Biogas	Not estimated. Costs may include upfront capital costs to install methane capture technologies and associated monitoring systems on landfills, as well as ongoing operating and maintenance costs. Savings may be associated with energy generation and feed-in-tariffs.				

Strategy Area	Action		Cost/MT CO_2e	Measure Lifetime	Simple Payback (Years)	Net Present Value	Co-Benefits
Land Use and Transportation[d]	LUT-1	Bicycle Programs and Supporting Facilities	Upfront capital costs associated with construction of half of the first two phases of bikeways in the Bicycle Master Plan estimated at $132 million, with annual maintenance costs equal to 10% of capital costs. Annual cost savings associated with reduced vehicle operating costs are estimated at approximately $10 million.				
	LUT-2	Pedestrian Network	Upfront capital costs for pedestrian improvements and traffic calming estimated at $23–$31 million, with annual maintenance costs equal to 10% of capital costs. Annual cost savings associated with reduced vehicle operating costs are estimated at approximately $4.9 million.				
	LUT-3	Transit Expansion	Not estimated.				
	LUT-4	Travel Demand Management	Not estimated.				
	LUT-5	Car-Sharing Program	Upfront costs to purchase vehicles estimated at $5.1 million. Member fees are assumed to cover operating, maintenance, and program costs on an annual basis. Annual cost savings associated with reduced personal vehicle operating costs are estimated at approximately $2.8 million.				
	LUT-6	Land Use Design and Density	Not estimated.				
	LUT-7	Transportation Signal Synchronization Program	The Metropolitan Transportation Authority (MTA) grants are expected to cover the costs of TSSP. Total program savings by 2020 are estimated at more than $524 million, including savings associated with reduced driver time, vehicle wear, and fuel consumption.				
	LUT-8	Electric Vehicle Infrastructure	Upfront costs to install electric vehicle supply equipment (EVSE), estimated at $5.3 million. Capital costs include transformers and panel upgrades for new sites as well as the equipment (e.g., conductors, connectors, plugs, and other apparatus), signage, and markings for the EVSE.				
	LUT-9	Idling Reduction Goal	Not estimated. Costs may include the cost of automatic engine shut down/start up systems, estimated at $1,000 per system. Annual cost savings per vehicle are estimated at $1,200, including savings associated with reduced fuel use and maintenance (e.g., oil changes, engine overhaul).				

Strategy Area	Action		Cost/MT CO_2e	Measure Lifetime	Simple Payback (Years)	Net Present Value	Co-Benefits
	LUT-10	Efficient Goods Movement	Not estimated. Costs may include planning costs, and capital costs for construction projects. Savings may include reduced costs associated with fewer vehicle miles traveled.				
	LUT-11	Sustainable Pavements Program	Not estimated. Some studies have shown that optimized pavement designs reduced net present costs by 40% to 50%.				
	LUT-12	Construction Equipment Electrification	Not estimated. Costs may include upfront costs to purchase or rent electric equipment. Savings may include the difference in operating costs. For a 170 horsepower air compressor operating 2,000 hours per year, annual cost savings of switching from diesel to electric could exceed $30,000.				
Water Conservation and Wastewater	WAW-1	Per Capita Water Use Reduction Goal	Not estimated. Recent studies have shown that incremental costs for upgrading to water efficient fixtures are negligible. Per-home annual savings for upgraded fixtures is estimated to exceed $200.				
	WAW-2	Recycled Water Use, Water Supply Improvement Programs, and Storm Water Runoff	Not estimated. Costs may include planning costs, capital costs to expand the recycled water infrastructure, and annual operating and maintenance costs. Engineering cost analysis conducted for the Los Angeles Department of Water and Power (LADWP) *Water Recycling Master Plan* indicates that recycled water (without treatment) could be delivered at a cost of $600/acre-foot (AF) to more than $2,000/AF, depending on the area and plan. Savings accrue to commercial and residential water customers, associated with substituting freshwater with recycled water use. These customers may also incur user-end retrofit costs for installing separate plumbing for nonpotable irrigation demands.				
Waste Reduction, Reuse, and Recycling	SW-1	Waste Diversion Goal	-$311 to -$512	NA	Net cost	NA	

Strategy Area	Action		Cost/MT CO_2e	Measure Lifetime	Simple Payback (Years)	Net Present Value	Co-Benefits
Land Conservation and Tree Planting	LC-1	Develop Urban Forests[e]	Exceeds -$1,000	40	Net cost	Exceeds -$70 million, not including the value of energy savings or co-benefits	
	LC-2	Create New Vegetated Open Space	Not estimated. Costs may include upfront costs to purchase and plant open space, as well as ongoing costs to maintain vegetation.				
	LC-3	Promote the Sale of Locally Grown Foods and/or Products	Not estimated. Costs may include upfront and ongoing programmatic costs to organize and promote local farmers markets.				
	LC-4	Protect Conservation Areas	Not estimated. Costs may include outreach and enforcement expenses.				

Note: Costs are shown as negative numbers. Savings are shown as positive numbers. Values do not include programmatic or staff costs that may be incurred by the County or local governments.

a. Cost analysis assumes implementation of solar PV; however, project applicants can install other solar technologies (e.g., solar thermal), as feasible, which may reduce costs, relative to standard PV systems.

b. This range is wide because it aggregates both residential and commercial buildings. Commercial green building development is estimated to be significantly more cost-effective than residential; commercial payback periods could be as short as 4 years, while residential paybacks are estimated to exceed 20 years.

c. This range reflects varying assumptions about the availability of solar rebates and incentives through the California Solar Initiative and project Solar Renewable Energy Certificate (SREC) values, as well as assumptions about future system costs and California market trends.

d. Cost estimates for land use and transportation actions do not take into account savings associated with public safety improvements, including reduced accidents and emergency services (as applicable).

e. Cost estimates for urban forestry do not take into account the savings associated with improving air quality, increase in home values, or other co-benefits.

Please refer to Appendix C for additional information on the individual actions, including goals and supporting policies.

4.5 Statewide GHG Reduction Measures

As discussed above, actions undertaken by the State will contribute to local GHG reductions in the unincorporated areas. For example, the RPS requires electric utility companies to increase their procurement of renewable resources by 2020. Renewable resources, such as wind and solar power, produce the same amount of energy as coal and other traditional sources, but do not emit any GHGs. By generating a greater amount of energy through renewable resources, electricity provided to the unincorporated areas will be cleaner and less GHG-intensive than if the State had not required the standard. Even though State measures do not always require local government action, emissions reductions achieved by this and other State measures will help lower GHG emissions in the unincorporated areas.

The County quantified five statewide initiatives that will contribute to community emissions reductions. The majority of emissions reductions will be achieved by statewide initiatives to improve vehicle engine efficiency and reduce the carbon intensity of transportation fuels. Additional reductions are gained from building energy efficiency standards and mandates for renewable energy generation. Specifically, Title 24 standards for new residential and non-residential buildings will require building shells and components be designed to conserve energy and water. The State's RPS will increase the amount of electricity generated by renewable resources, reducing GHG emissions from electricity consumption.

The final State action included in the CCAP will result in local GHG reductions from the California cap-and-trade program. The cap-and-trade program creates a market-based system with an overall emissions limit for electricity generation, large industrial sources, and onroad fuel combustion. While GHG reductions achieved by the cap-and-trade program are variable and influenced by market conditions, technological advancements, and other GHG legislation, the ARB currently estimates that the program will reduce statewide GHG emissions by 23 million metric tons CO_2e by 2020 on top of other State actions. Local cap-and-trade benefits in the electric and onroad transportation sectors are included in the County's CCAP based on available research on anticipated changes in fuel costs and consumer responses.

Table 4-3 summarizes the State programs included in the County's CCAP, as well as anticipated GHG reductions.

Table 4-3. Summary of Statewide Actions and Associated 2020 GHG Emissions Reductions

Statewide Action		2020 Emissions Reduction (MT CO_2e)	Percent of State Reductions
STATE-1	Renewables Portfolio Standard	336,466	21%
STATE-2	Title 24 Standards for Commercial and Residential Buildings (Energy Efficiency and CALGREEN)	91,039	6%
STATE-3	Pavley/Advanced Clean Cars (Vehicle Efficiency) and Low Carbon Fuel Standard for On-Road Transportation	964,781	61%
STATE-4	Low Carbon Fuel Standard for Off-Road Equipment and Vehicles	2,394	<1%
STATE-5	California Cap-and-Trade Program	176,845	11%
Total Statewide Reductions		1,571,526	100%

Chapter 5

Implementation Program

"The challenges of global warming require a commitment, vigilance and the ability to learn and adapt quickly, yet thoughtfully, so that we continue to provide for our own needs while not undermining the ability of societies in the far corners of the world nor future generations to meet theirs."

—California Air Resources Board

Community meeting © LA County Department of Regional Planning

5.1 Introduction

This section describes the objectives, milestones, timeline, and processes for implementation of the CCAP. In general, the County will have limited responsibility for State programs, other than tracking GHG benefits. Many of the local actions will also be implemented through General Plan policies or other County ordinances. Accordingly, establishing a cohesive management approach is necessary to ensure the CCAP actions are implemented in a timely manner. The following sections summarize implementation steps for each CCAP action, potential funding options by strategy area, plans for monitoring and evaluating the CCAP, and strategies for future CCAP updates. Much of the text is broad to enable flexibility in developing future implementation polices, consistent with other County planning efforts, such as the General Plan.

5.2 CCAP Implementation Team

The County has designated a CCAP Implementation Team (CIT) to lead and coordinate the County's efforts on CCAP implementation, monitoring, and plan updates. The CIT will meet regularly, report directly to the County Board of Supervisors, and will comprise representatives from several County departments. The CIT representatives will work with the representatives from each of the County departments on CCAP action implementation, as well as with external agencies, and will provide guidance and support on financial, programmatic, and technical matters. The CIT will be responsible for updating and maintaining the CCAP, maintaining the CCAP implementation schedule, and identifying and pursuing financing for the CCAP actions. A major objective of the CIT will be to identify opportunities for "bundling" actions during the CCAP implementation phase. The County recognizes that "bundling" complementary actions will support the anticipated cumulative impact of the CCAP actions and create multiple additional benefits, such as cost-savings, interagency coordination, improved CCAP action outcomes, and community support.

5.3 Implementation of CCAP Actions

The following is a list of general implementation steps that the County will undertake to implement each CCAP local action.

Develop implementation plans for each CCAP action: The CCAP action lead entities identified in Table 5-1 will develop specific implementation plans for each CCAP action. These implementation plans will include specific milestones, deadlines, funding opportunities, partners, programs, and other details, as necessary, to initiate implementation of the CCAP action.

Estimate project-specific costs: The estimated costs/savings for the CCAP actions are provided in Chapter 4. During the implementation phase of each action, project-specific costs/savings will be prepared to provide a more accurate assessment of up-front investment needs, potential capital returns, and other financial planning metrics.

Adopt or update ordinances and/or codes: Some local actions require amendments to the Los Angeles County Code.

Establish partnerships: Some of the CCAP actions will require new program partnerships, both internal to the County and with external agencies, in order to leverage staff expertise and agency resources and to maximize funding opportunities.

Pursue funding sources: Funding from State and federal agencies can support the implementation of the CCAP actions. The County will pursue these (and other emerging) funding sources as a part of implementation efforts. The County will also consider internal funding sources such as facility master plan programs and capital improvement programs.

Create monitoring/tracking processes and indicators: All of the CCAP actions will require tracking and monitoring of program progress, particularly to identify and remedy any shortfalls in a timely manner. For each action, the County will identify monitoring and tracking procedures, as well as tracking indicators.

Engage the community and stakeholders in CCAP action implementation: The County will engage with and educate the public and stakeholder groups in the implementation of each CCAP action. The County will solicit input to design effective implementation programs for each CCAP action. Community engagement activities may include early and ongoing outreach to relevant stakeholder groups, providing clear and topic-specific messages on CCAP actions, soliciting feedback, holding multiple public meetings throughout each CCAP action implementation process, connecting through existing events and online media, and providing materials. During this process, the County will consider climate change risks to specific populations or within specific geographic areas of the County and determine how to address these risks during the action implementation.

Table 5-1 below lists initial implementation steps for each CCAP action. These initial implementation steps are in most cases related to the general implementation steps listed above, though specific to the particular CCAP action, and are not exhaustive. Table 5-1 also lists the County department responsible for the implementation of the particular CCAP action ("lead entity"). Upon adoption of the CCAP, County departments will be responsible for implementing the assigned CCAP actions, though private or other types of entities may be responsible for implementation of specific projects under each CCAP action. To the extent possible, supporting entities are also listed below.

Table 5-1. CCAP Implementation Steps

Strategy Area	Action	Initial Implementation Step(s)	Lead County Entity (Supporting Entity)
Green Building and Energy	Green Building Development	• Consider funding and program options • Initiate outreach, training, and education programs	ISD (DRP)
	Energy Efficiency Programs	• Consider funding and program options to expand the County's Energy Upgrade program • Develop energy conservation campaigns and low-interest financing options • Identify partnerships with utilities and other entities to expand existing rebate or incentive programs	ISD (DRP)
	Solar Installations	• Identify and remove regulatory or procedural barriers to producing solar energy in building and development codes, design guidelines, and zoning ordinances • Identify partnerships with utilities and other entities to expand existing incentive programs • Adopt the Renewable Energy Ordinance that outlines development guidelines for solar installation • Initiate outreach and education programs	DRP (ISD, DPW)
	Alternative Renewable Energy Programs	• Coordinate with the LADWP to identify potential alternative energy projects or facility types for the unincorporated areas	ISD (DRP, DPW)
	Wastewater Treatment Plant Biogas	• Identify incentives for renewable biogas projects • Identify potential renewable biogas projects	All Operators of Sanitation Facilities
	Energy Efficiency Retrofits of Wastewater Equipment	• Partner with facility operators to identify equipment slated for retirement • Develop a best management practices checklist for reducing equipment energy consumption	All Operators of Sanitation Facilities
	Landfill Biogas	• Identify incentives for landfill biogas projects • Identify partners and potential landfill biogas projects	All Operators of Landfill Facilities
Land Use and Transportation	Bicycle Programs and Supporting Facilities	• Implement select programs of the 2012 Bicycle Master Plan • Work with transit stations/hub property owners, private property owners/developers and County facility managers on opportunities to provide end of trip facilities for bicycle riders, including showers, secure bicycle lockers, and changing spaces, as outlined in the County's Healthy Design Ordinance Plan and implement infrastructure improvements to promote bicyclist "first mile—last mile" access to and from transit station/hub origin and destitution points.	DPW, DPH and DRP (Other County Departments)

Strategy Area	Action	Initial Implementation Step(s)	Lead County Entity (Supporting Entity)
	Pedestrian Network	• Develop active transportation networks for Transit Oriented District plans that will promote livability. • Provide traffic calming measures. • Implement active transportation design policies and pedestrian improvement strategies outlined in the County's Healthy Design Ordinance. • Plan and implement infrastructure improvements to promote pedestrian "first mile—last mile" access to and from transit station/hub origin and destitution points.	DPW, DPH, and DRP (ISD)
	Transit Expansion	• Collaborate with LA Metro on a program that prioritizes transit • Plan and implement local community transit services that provide efficient connections to regional transit facilities • Explore programs to offer discounted transit passes • Plan and implement infrastructure improvements to promote bicycle and pedestrian "first mile—last mile" access to and from transit station/hub origin and destitution points.	DPW (DRP)
	Travel Demand Management	• Encourage ride-sharing programs and a permanent transportation management association membership • Implement marketing strategies to reduce commute trips • Encourage employer-sponsored vanpools or shuttles • Encourage market-based bike sharing programs that support bicycle use around and between transit stations/hubs.	CEO (All County Departments))
	Car-Sharing Program	• Conduct a feasibility study to identify priority residential and non-residential areas for implementation • Explore incentives to encourage employer-based and private-car sharing programs	CEO (All County Departments)
	Land Use Design and Density	• Implement the County's Transit Oriented District Program and Healthy Design Ordinance	DRP (DPW)
	Transportation Signal Synchronization Program	• Continue to implement projects for signal improvements • Identify additional funding opportunities to expand project implementation	DPW
	Electric Vehicle Infrastructure	• Install EV charging infrastructure at public venues • Identify opportunities to streamline County permitting processes for installing home and commercial EV charging	ISD (DPW, DRP)
	Idling Reduction Goal	• Initiate development of an idling ordinance or policy that outlines goals for reduced equipment idling • Develop an outreach and education program	DRP (DPW, DPH)

Strategy Area	Action	Initial Implementation Step(s)	Lead County Entity (Supporting Entity)
	Efficient Goods Movement	• Coordinate with SCAG to facilitate implementation of a region-wide goods movement strategy • Support SCAG and LA Metro on the evaluation of truck routes throughout the Count to identify and target areas for improvement	DPW (DRP)
	Sustainable Pavements Program	• Identify potential projects for pavement improvements • Identify additional funding opportunities to expand project implementation • Investigate opportunities to use new materials that are more effective or achieve cost savings • Investigate opportunities to use cool or porous pavements, as feasible, to reduce urban heat island effect and conserve water	DPW
	Electrify Construction and Landscaping Equipment	• Develop an outreach and education program • Identify incentives for equipment electrification • Collaborate with regulatory agencies such as South Coast Air Quality Management District (SCAQMD) to identify potential customers • Coordinate with SCAQMD to implement an incentive program and/or lawnmower exchange program • Develop an outreach and education program	DPW (DRP, DPR, BH)
 Water Conservation and Wastewater	Per Capita Water Use Reduction Goal	• Promote strategies for water efficiency, retrofits, education, and water auditing • Expand the County's Drought-Tolerant Landscaping Ordinance and the State's Model Water Efficiency Landscape Ordinance (MWELO) by requiring the reduction of outdoor potable water use • Identify funding and incentive options, training and outreach programs	DPW (Water Agencies, DPW, ISD)
	Recycled Water Use, Water Supply Improvement Programs, and Storm Water Runoff	• Coordinate with water agencies to identify opportunities to expand groundwater management and begin development of groundwater management plans • Expand the Low Impact Development (LID) stormwater catchment to more facilities, if feasible • Identify partnership opportunities with regional entities or opportunities to expand regional programs	DPW (DPR, DRP, ISD)
 Waste Reduction, Reuse, and Recycling	Waste Diversion Goal	• Adopt a construction and building materials and demolition debris ordinance that requires 70% of waste be diverted from landfills • Develop an outreach and education program • Coordinate with waste service providers to develop incentives and neighborhood-level initiatives for recycling and composting	DPW (DRP)

Strategy Area	Action	Initial Implementation Step(s)	Lead County Entity (Supporting Entity)
Land Conservation and Tree Planting	Develop Urban Forests	• Promote tree planting for residential and non-residential developments, consistent with the County's Healthy Design Ordinance • Conduct a tree inventory to identify tree-deficient neighborhoods • Partner with external and internal organizations to promote urban forests and volunteer events	Fire (DPR, DRP)
	Create New Vegetated Open Space	• Identify restoration projects • Consider funding and program options • Promote community-based restoration programs	Fire (DRP, DPR, DPW)
	Promote the Sale of Locally Grown Foods and/or Products	• Expand the Healthy Design Ordinance to encourage and support farmers markets at community parks • Develop an education and outreach program	DRP(AC, DRP, DPH)
	Protect Conservation Areas	• Evaluate the Oak Woodland Conservation Management Plan and consider revisions to further preserve existing oak woodland • Inventory environmental, economic, and public benefits provided by conservation areas prioritize these conservation areas that benefit multiple end uses.	DRP (DPR, DPW)

AC	=	Agricultural Commissioner
BH	=	Beaches and Harbors
CEO	=	CEO Office of Workplace Programs
DRP	=	Department of Regional Planning
DPH	=	Department of Public Health
DPR	=	Department of Parks and Recreation
DPW	=	Department of Public Works
Fire	=	Fire Department
ISD	=	Internal Services Department

5.4 CCAP Implementation Schedule

To achieve the County's GHG reductions goal by 2020, CCAP implementation will need to be rapid after adoption (i.e., 2015 to 2016). All actions will be implemented with equal priority given the short timeframe. The County's lead agency for each action will develop a specific timeline and milestone(s) for each action based on the general schedule shown in Table 5-2, as part of the action's individual implementation plan. The schedule in Table 5-2 is preliminary and may be modified during CCAP implementation.

Table 5-2. Preliminary CCAP Implementation Schedule

Timeframe	CCAP Implementation Milestone
2014	CCAP adoption
2015	Implementation plans completed for each action; milestones identified
2015	Funding recommendations and applications for grants completed
2015–2017	All ordinances completed and adopted
2015, 2017, 2019, 2021	Inventory updates
2016	Partner programs in place
2020	Reductions achieved
Annually, beginning in 2015	CCAP review and update

Some actions require new ordinances or updates to existing ordinances; these will be completed in 2015. Implementation plans for each action, including identification of specific action milestones (and deadlines), will also be completed in 2015. The County will complete its funding recommendations for each action and submit any needed grant or funding applications in 2015. By 2016, the County anticipates that any public or partner programs will be in place. Inventory updates will be completed every other year, beginning in 2015, to track emissions. The County will also complete an annual CCAP review and update, as part of the *General Plan Annual Progress Report,* beginning in 2015.

5.5 CCAP Funding

Los Angeles County, private residents and businesses in the unincorporated areas, utilities, and other public sector agencies will incur costs to implement the CCAP actions. In some cases, despite up-front capital costs, these entities will also realize long-term savings resulting from reduced energy and maintenance costs that can help recoup these initial investments. Furthermore, there are many rebates, incentives, and grant programs available to reduce up-front capital costs and alleviate the overall project costs. Several of these funding opportunities are discussed below.

5.5.1 CCAP Funding at the Plan Level

Estimated costs and savings associated with many of the CCAP actions are presented in Chapter 4, along with other outcomes of the financial analysis conducted for these actions, such as costs/MT CO_2e and net present value (a metric for the time value of the original investment). Table 5-3 summarizes the total CCAP (i.e., "plan-level") upfront costs, annual savings/costs, and responsible entities for all of the quantified actions in each of the CCAP strategy areas.

Table 5-3 shows that implementation of the CCAP requires considerable investment, to be shared across multiple entities and the broader community.[8] The County anticipates a leadership role in identifying, pursuing, and distributing relevant funding for the CCAP actions, working collaboratively with other entities in the County to ensure that the CCAP actions are funded and implemented in a timely manner. The County's overall strategies for funding the CCAP actions include the following.

- Pursue funding for actions concurrently, whenever possible, to utilize funds most efficiently.
- Leverage federal, state, and regional grants and other funding sources.
- Partner with other jurisdictions and regional entities to administer joint programs and with the private sector on action implementation.

[8] Table 5-3 only presents cost data for actions that were quantified as part of the cost analysis. Please refer to Table 4-2 for a qualitative summary of expected costs for all other actions.

Table 5-3. CCAP Total Upfront Costs and Annual Savings/Costs by Strategy Area (Plan-Level)

Strategy Area	Action		Upfront Costs	Entity Incurring Upfront Costs	Annual Net Savings/Costs(-)	Entity Incurring Annual Savings/Costs
Green Building and Energy	BE-1	Green Building Development	$2.7 million to $3.5 million	Building owners	$0.2 million	Building owners, tenants
	BE-2	Energy Efficiency Programs	$72 million to $156 million	Building owners	$16 million	Building owners, tenants
	BE-3	Solar Installations—Direct Purchase	$388 million to $658 million	Building owners	$38 million	Building owners, tenants
		Solar Installations—Power Purchase Agreement (PPA)	NA	NA	-$4.3 million to $3.9 million	Building owners
Land Use and Transportation	LUT-1	Bicycle Programs and Supporting Facilities	$132 million	Local government; businesses adding bicycle facilities	Annual maintenance costs estimated at $13.2 million; annual savings associated with reduced vehicle operating costs are estimated at approximately $10 million; additional costs for bicycle purchase and maintenance not quantified.	Local government; businesses adding bicycle facilities; vehicle owners; bicyclists
	LUT-2	Pedestrian Network	$23 million to $31 million	Local government	Annual maintenance costs estimated at $2.3 to $3.1 million; annual savings associated with reduced vehicle operating costs are estimated at approximately $4.9 million.	Local government; vehicle owners

Strategy Area	Action		Upfront Costs	Entity Incurring Upfront Costs	Annual Net Savings/Costs(-)	Entity Incurring Annual Savings/Costs
	LUT-5	Car-Sharing Program	$5.1 million	Local government and/or program operator (depending on cost structure)	Member fees are assumed to cover operating, maintenance, and program costs on an annual basis. Annual cost savings associated with reduced personal vehicle operating costs are estimated at approximately $2.8 million.	Program operator and members; vehicle owners
	LUT-7	Transportation Signal Synchronization Program	Costs are expected to be covered by future MTA grants of approximately $54 million.	Costs are expected to be covered by future MTA grants	Annual savings in 2020 associated with reduced driver time, vehicle wear, and fuel consumption estimated at $21 million. Maintenance costs not quantified.	Vehicle owners
	LUT-8	Electric Vehicle Infrastructure	$5.3 million	Local government, or a third-party operator, depending on implementation strategy	Annual costs/savings will depend on program design features such as access fees or rate structures.	Program operator and members; vehicle owners
	LUT-9	Idling Reduction Goal	$0.1 million	Vehicle owners	$0.2 million	Vehicle owners
Waste Reduction, Reuse, and Recycling	SW-1	Waste Diversion Goal	Costs associated with recycling and diversion facilities not quantified.	LA County, waste haulers, and residents	-$7 million to -$12 million	LA County, waste haulers, and residents

Strategy Area	Action		Upfront Costs	Entity Incurring Upfront Costs	Annual Net Savings/Costs(-)	Entity Incurring Annual Savings/Costs
Land Conservation and Tree Planting	LC-1	Develop Urban Forests	$32 million to $45 million	Local government	-$5.4 million to -$16.5 million in annual maintenance costs; $0.5 million in annual energy savings; co-benefits not quantified.	Local government

Various funding options are available to finance the CCAP actions and can provide initial capital, reduce overall program costs, or support long-term initiatives. The following lists potential sources of funding for each of the strategy areas.

Green building and energy: Funding sources for this strategy area include utility rebates such as the California Solar Initiative and Energy Upgrade California—Los Angeles, federal tax credits for energy efficiency, energy efficient mortgages, power purchase agreements, planning grants (such as the Strategic Growth Council grants), CaliforniaFIRST, LA Property Assessed Clean Energy (PACE), private equity funding, and revolving loan funds.

Land use and transportation: Potential funding sources include federal transportation programs such as the Transportation Funds for Clean Air, the National Highway System Fund, Safe Routes to School, and the Congestion Mitigation and Air Quality Program; State programs such as California's Bicycle Transportation Account, Carl Moyer Program, and State Transit Assistance Funds; and local programs such as fare increases and CIP funds.

Water conservation and wastewater: Mechanisms for financing water conservation and wastewater programs may include water and wastewater rate increases, fixture install rate increases, private equity funds, and revolving loan funds.

Waste reduction, reuse, and recycling: CalRecycle grant programs are authorized, by State legislation, to assist public and private entities in the safe and effective management of the waste stream. Funds are intended to further reduce, reuse, and recycle all waste, encourage development of recycled content products and markets, protect public health and safety, and foster environmental sustainability. Incorporated cities and counties in California, as identified by the California Department of Finance, are eligible to receive funding.

Land conservation and tree planting: These measures will likely require funding from the County's General Fund, federal or State grants, and private funds. CalFire's Urban and Community Forest Program offers a number of grants under Propositions 40 and 84 for tree planting, tree inventories, management plans, urban forest educational efforts, and innovative urban forestry projects. For example, the "Leafing Out" program helps governments, schools, and non-profit organizations establish initial urban forestry efforts, whereas the "Green Trees for the Golden State Grant Program" provides funding for individual urban tree projects, including up to two years of initial maintenance.

5.5.2 Project Level Incentive Examples

Incentives and rebates can significantly improve the economics of individual projects. For example, incremental upfront costs for a new commercial building to implement Tier 1 CALGREEN measures are estimated for the CCAP at around $79,000 (for a five-story office building of 52,900 square feet). Assuming eligibility requirements are met and incentives are available at the time of application, commercial building owners could recoup approximately 13% of that upfront cost by applying for Southern California Edison's (SCE) Savings By Design Program. This program offers a sliding scale of between $0.10 and $0.30/annualized kWh in incentive payments.

In another example, the analysis completed for the CCAP estimates upfront costs for improvements to reduce energy consumption by 20 percent in an existing non-residential building at $47,000 to $75,000 (for a 50,000 square foot building). Taken together, State and federal tax incentives, favorable financing through programs such as LA County PACE and on-bill financing from SCE, and other incentive and rebate options can cover 50% or more of total project costs (Energy Upgrade California 2013).

For residential homes, eligible homeowners can receive up to $4,500, as well as favorable financing options, for energy efficiency upgrades through Energy Upgrade California. Upfront costs are estimated at between $4,300 to $9,600 to install or upgrade to energy efficient indoor lights, an electric clothes dryer, a programmable thermostat, gas water heater, energy-efficient clothes washer and refrigerator, gas furnace, air sealing, attic insulation, duct sealing, windows, central air conditioner, duct insulation, or a cool roof.

Where upfront costs are reduced through incentive funding then payback periods would be correspondingly reduced.

Utility Rebates

Many utility providers in the County offer subsidies and rebates for reducing your water or energy usage in your home or business. "Cash for Grass" programs provide subsidies for removing water-intensive lawns and replacing them with mulch or native plants. High-efficiency water appliances like washers, sprinkler systems, and shower heads are also offered at a discount or are eligible for rebates. Check to see what programs are available at http://green.lacounty.gov/wps/portal/green.

5.6 Evaluation and Monitoring

The County will track the CCAP's overall progress in terms of reducing GHG emissions in the unincorporated areas, as well as each CCAP action's progress and performance. The County will prepare updates to the GHG emissions inventory for the unincorporated areas on a bi-annual basis, for comparison to the 2010 inventory and to assess progress towards the 2020 reduction target. These inventory updates will be incorporated into the corresponding *General Plan Annual Progress Report*. The first inventory update will be conducted in 2015 for the 2014 inventory year and then subsequent updates will be completed for 2016, 2018, and 2020 (in the year following). These inventory updates will provide information regarding overall trends in community emissions for the unincorporated areas, but will not isolate the impact of the CCAP actions on the emissions. To do so, the County will undertake an analysis of the influence of other factors on overall emissions, such as temperature, changes in emissions factors (particularly for the power sector, whose sources may change due to drought and other conditions), employment, gross domestic product, and population.

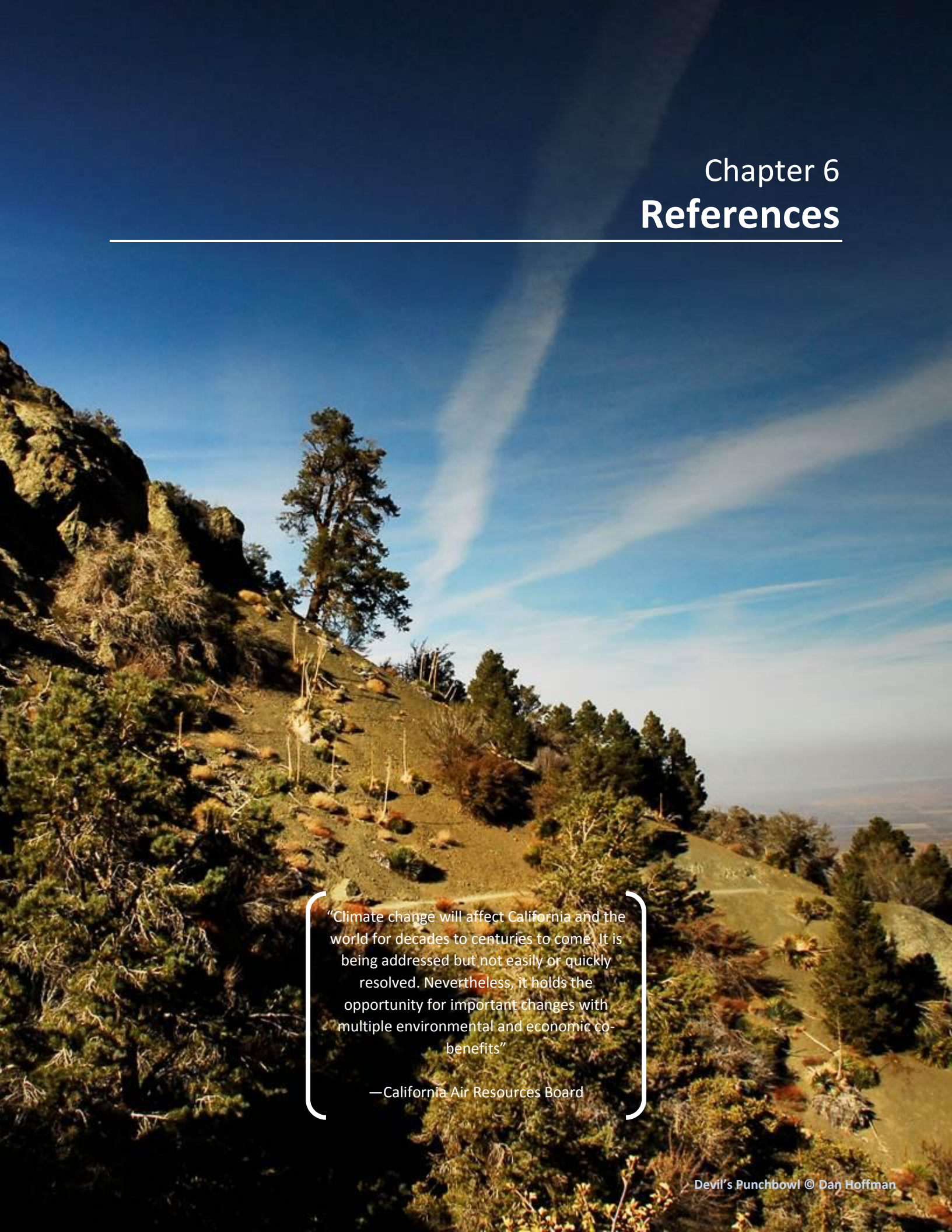
The County will also annually track the progress of each CCAP action for GHG reductions achieved, costs/savings, and energy/water/VMT reduced, or other appropriate parameters. The lead department for implementation of each CCAP action will establish tracking parameters, a monitoring schedule, milestone criteria, and steps for remedying any shortfalls in anticipated reductions.

5.7 CCAP Updates and Plan Evolution

Technologies, financing, regulations/policies, and behavior relevant to the strategy areas in the CCAP are constantly changing. In addition, it is possible that CCAP actions and related efforts may be delayed or modified, risking achievement of the CCAP target. Given these factors, the County will continually monitor CCAP progress and modify the CCAP, as needed, to reflect new policies, technologies, and financing opportunities. Changes to the CCAP will be included in the County's *General Plan Annual Progress Report*. Major changes to the CCAP, such as modification of the County's reduction target or adoption of additional reduction targets, will require public notice and approval from the County's Board of Supervisors.

As the year 2020 approaches, the County will develop a target for years beyond 2020 (such as 2035 and 2050) in order to continue the County's commitment to reducing its community climate change impact. County staff will propose a target for consideration by the Board of Supervisors and will provide an assessment of the potential impact of meeting this target on the community in the unincorporated areas, as well as on the County's internal resources. The County will likely rely on analyses and programs currently under development by CARB regarding the State's programs and continuation of the AB 32 *Scoping Plan* beyond 2020. The actions included in this CCAP will help to put the County on a path to achieve more substantial reductions in the years after 2020. The County will develop a substantial update to this CCAP for the years after 2020 by December 31, 2021. The CCAP update will take effect in 2022, allowing consideration of the achievement of the CCAP 2020 target as well as the State's achievement of the AB 32 overall goal.

Chapter 6
References



"Climate change will affect California and the world for decades to centuries to come. It is being addressed but not easily or quickly resolved. Nevertheless, it holds the opportunity for important changes with multiple environmental and economic co-benefits"

—California Air Resources Board

Devil's Punchbowl © Dan Hoffman

Cal-Adapt. n.d. *cal-adapt: Exploring California's Climate Change Research*. Available: <http://cal-adapt.org/>.

California Air Resources Board. 2008a. *Climate Change Scoping Plan, Economic Analysis Supplement*. December. Available: <http://www.arb.ca.gov/cc/scopingplan/document/economic_analysis_supplement.pdf>.

California Air Resources Board. 2008b. *Climate Change Draft Scoping Plan, Public Health Analysis Supplement*. December. Available: <http://www.arb.ca.gov/cc/scopingplan/document/executive_summary_publichealth.pdf>.

California Air Resources Board. 2008c. *Climate Change Scoping Plan*. December. Pursuant to AB 32, the California Global Warming Solutions Act of 2006. Available: <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>. Accessed: May 2013.

California Climate Change Center. 2012. *Our Changing Climate 2012, Vulnerability & Adaptation to the Increasing Risks from Climate Change in California.* California Climate Change Center. Available: <http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf>.

California Department of Water Resources. 2014. *DWR Director Welcomes Coordinated Federal Drought Aid*. Released: February 5, 2014. Available: <http://www.water.ca.gov/news/newsreleases/2014/020514.pdf>. Accessed: February 11, 2014.

California Department of Public Health. n.d. *ASTHO Climate Change Population Vulnerability Screening Tool*. Prepared by the California Environmental Health Tracking Program (CEHTP). Available: <http://www.ehib.org/projects/ehss01/Climate%20change%20vulnerability%20report_ASTHO.pdf>.

California Department of Public Health. 2012. *Climate Action for Health: Integrating Public Health into Climate Action Planning*. February.

Center for Climate and Energy Solutions. 2011. *The Greenhouse Effect*. Available: <http://www.c2es.org/facts-figures/basics/greenhouse-effect>. Accessed: May 3, 2013.

Centers for Disease Control and Prevention. 2010. *Climate and Health Program*. Last Revised: November 29, 2010. Available: <http://www.cdc.gov/climateandhealth/effects/default.htm>. Accessed: June 17, 2013.

Cook, J., Nuccitelli, D., Green, S., Richardson, M., Winkler, B., Painting, R., Way, R., Jacobs, P., and Skuce, A. 2013. *Quantifying the consensus on anthropogenic global warming in the scientific literature*. Environmental Research Letters 8(2): 024024.

Energy Upgrade California. 2013. Los Angeles County PACE. Available: <https://lapace.org/tax-incentives.html>. Accessed: November 2013.

ICLEI. 2012. Version 1.0. *Local Governments for Sustainability USA*. Available to local governments at: http://www.icleiusa.org/tools/ghg-protocol/community-protocol/us-community-protocol-for-accounting-and-reporting-of-greenhouse-gas-emissions.

Intergovernmental Panel on Climate Change (IPCC). 2007a. *Climate Change 2007: The Physical Science Basis–Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H. L. Miller (eds.). Cambridge University Press. New York, NY.

Intergovernmental Panel on Climate Change (IPCC). 2007b. *Climate Change 2007: Impacts, Adaptation and Vulnerability–Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden and C. E. Hanson (eds.). Cambridge University Press. New York, NY.

Maizlish, N., Woodcock, J., Co, S., Ostro, B., Fanai, A., and Fairley, D. 2011. *Health Co-Benefits and Transportation-Related Reductions in Greenhouse Gas Emissions in the Bay Area*. November.

National Oceanic and Atmospheric Administration. 2013. *Climate at Glance*. Available: <http://www.ncdc.noaa.gov/cag/time-series/us/tmp/ytd/04/23174/12/1945-2013?base_prd=true&begbaseyear=1945&endbaseyear=2012&trend=true&trend_base=10&begtrendyear=1945&endtrendyear=2012&filter=true>. Accessed: July 9, 2013.

Sun F., D. Walton, A. Hall. 2013. *Mid-century and end-of-century changes in temperature and heat extremes under "business-as-usual" and "mitigation" scenarios in the Los Angeles region*. In preparation.

University of California, Los Angeles. 2012. *C-Change.LA, Climate Change in Los Angeles.* Available: <http://c-change.la/>.

Urban Land Institute. 2007. Growing Cooler: The Evidence on Urban Development and Climate Change.

U.S. Environmental Protection Agency. 2014. *Greenhouse Gas Equivalencies Calculator*. Last Revised: April 16, 2014. Available: <http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results>. Accessed: May 8, 2014.

Appendix A
Relevant Greenhouse Gas Legislation and Regulation

This appendix provides additional information on federal, State, and regional GHG legislation applicable to the County's efforts to reduce GHG emissions and implement the CCAP.

Federal Regulation

Although there is currently no overarching federal law specifically related to climate change or the reduction of GHGs, regulation of key sources under the federal Clean Air Act (CAA) is underway with the U.S. Environmental Protection Agency (US EPA) in a lead role. Although periodically debated in Congress, no federal legislation concerning GHG limitations is likely in the foreseeable future and the current administration is presently only focused on executive branch action using existing authorities.

Figure 1 displays a timeline of key State and federal regulatory activity.

Massachusetts, et al. vs. U.S. Environmental Protection Agency (2007)

Twelve U.S. states and cities, including California, in conjunction with several environmental organizations, sued to force EPA to regulate GHGs as a pollutant pursuant to the CAA in *Massachusetts, et al. v. Environmental Protection Agency,* 549 US 497 (2007). The court ruled that the plaintiffs had standing to sue, GHGs fit within the CAA's definition of a pollutant, and the EPA's reasons for not regulating GHGs were insufficiently grounded in the CAA. This ruling allowed the regulation of GHGs under the CAA by the EPA.

United States Environmental Protection Agency Endangerment Finding (2009)

In its "Endangerment Finding," the EPA Administrator found that GHGs in the atmosphere threaten the public health and welfare of current and future generations. The Administrator also found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare. Although the Finding of Endangerment does not place requirements on industry, it is an important step in EPA's process to develop regulation. This measure was a prerequisite to finalizing EPA's proposed GHG emission standards for light-duty vehicles.

United States Environmental Protection Agency Mandatory Reporting Rule for Greenhouse Gas (2009)

Under the Mandatory Reporting Rule, suppliers of fossil fuels, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons of CO_2e or more per year of GHGs are required to report annual emissions to the EPA. The mandatory reporting rule does not limit GHG emissions but establishes a standard framework for emissions reporting and tracking of large emitters (U.S. Environmental Protection Agency 2010).

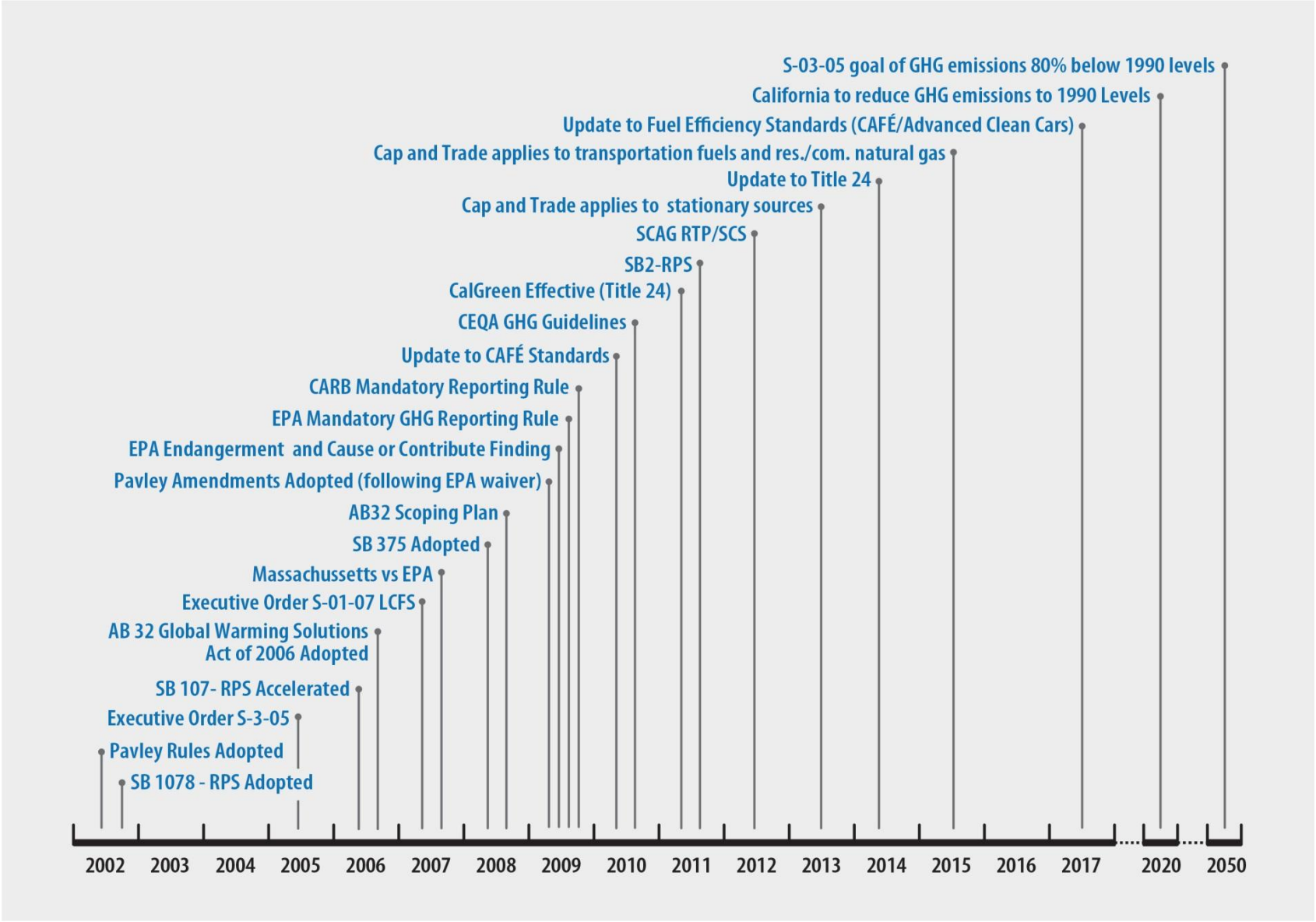


Figure 1. Key Milestones in Federal and State Climate Legislation

U.S. Environmental Protection Agency Cause or Contribute Finding (2010)

In its "Cause or Contribute Finding," the EPA Administrator found that the combined emissions of GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare (U.S. Environmental Protection Agency 2010).

Update to Corporate Average Fuel Economy Standards (2010/2012)

The current Corporate Average Fuel Economy (CAFE) standards (for model years 2011 to 2016) incorporate stricter fuel economy requirements promulgated by the federal government and California into one uniform standard. Additionally, automakers are required to cut GHG emissions in new vehicles by roughly 25% by 2016 (resulting in a fleet average of 35.5 miles per gallon [mpg] by 2016). Rulemaking to adopt these new standards was completed in 2010. California agreed to allow automakers who show compliance with the national program to also be deemed in compliance with State requirements. The federal government issued new standards in 2012 for model years 2017–2025, which will require a fleet average of 54.5 mpg in 2025.

EPA Regulation of Stationary Sources Under the Clean Air Act (Ongoing)

Pursuant to its authority under the CAA, the EPA has been developing regulations for new stationary sources such as power plants, refineries, and other large sources of emissions. Pursuant to the President's 2013 Climate Action Plan, the EPA will be directed to also develop regulations for existing stationary sources.

State Legislation

California has adopted statewide legislation addressing various aspects of climate change and GHG emissions mitigation. Much of this legislation is not directed at citizens or jurisdictions specifically, but rather establishes a broad framework for the State's long-term GHG reduction and climate change adaptation program. Former Governor Schwarzenegger and current Governor Brown have also issued several executive orders related to the State's evolving climate change policy. Of particular importance to local governments is the direction provided by the AB 32 *Scoping Plan*, which recommends local governments reduce their GHG emissions by a level consistent with State goals.

Summaries of key regulations and legislation at the State level are provided below. Figure 1 displays a timeline of key State and federal regulatory activity.

Assembly Bill 1493—Pavley Rules (2002, Amendments 2009, 2012 Rule-Making)

Known as "Pavley I," AB 1493 standards were the nation's first GHG standards for automobiles. AB 1493 requires the California Air Resources Board (CARB) to adopt vehicle standards that will lower GHG emissions from new light-duty autos to the maximum extent feasible beginning in 2009.

Additional strengthening of the Pavley standards (referred to previously as "Pavley II", now referred to as the "Advanced Clean Cars" initiative) has been proposed for vehicle model years 2017–2025. Together, the two standards are expected to increase average fuel economy to roughly 43 miles per gallon by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14%. In June 2009, the EPA granted California's waiver request enabling the State to enforce its GHG emissions standards for new motor vehicles beginning with the current model year.

EPA and CARB have worked together on a joint rulemaking to establish GHG emissions standards for model-year 2017–2025 passenger vehicles. As noted above, the federal government completed rulemaking in 2012 that resulted in adoption of new standards that would lead to fleet average of 54.5 mpg in 2025. Also in 2012, CARB strengthened its Zero Emission Vehicle (ZEV) program to require 15% of automakers' annual new vehicle sales in California to be ZEV or transitional-ZEV by 2025.[1]

Senate Bills 1078 (2002)/107 (2006) and Senate Bill 2 (2011)—Renewables Portfolio Standard

Senate Bills (SB) 1078 (2002) and 107 (2006), Renewables Portfolio Standard (RPS), required investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure 20% of retail sales in 2010 from eligible renewable sources. The California Public Utilities Commission (CPUC) and CEC are jointly responsible for implementing the program. Senate Bill 2 (2011) set forth a longer range target of procuring 33% of retail sales by 2020.

Executive Order S-03-05 (2005)

EO S-03-05 established the following GHG emission reduction targets for California's State agencies.

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80% below 1990 levels.

Executive orders are binding only on State agencies. Accordingly, EO S-03-05 guides State agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local government or private actions. The Secretary of the California Environmental Protection Agency (CalEPA) is required to report to the Governor and State legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this executive order.

Assembly Bill 32—California Global Warming Solutions Act (2006)

AB 32 codified the State's GHG emissions target by requiring that the State's global warming emissions be reduced to 1990 levels by 2020. Since being adopted, CARB, CEC, CPUC, and the Building Standards Commission have adopted regulations that will help meet the goals of AB 32.

[1] These categories include all-battery electric vehicles, plug-in hybrid electric vehicles, hydrogen fuel cell vehicles, and hydrogen internal combustion vehicles.

The AB 32 *Scoping Plan* establishes a framework for achieving statewide GHG reductions required by AB 32 to reduce GHG emissions to 1990 levels by 2020. The *Scoping Plan* describes a list of measures that the State will undertake, and the anticipated GHG reductions associated with these measures. It requires CARB and other State agencies to develop and enforce regulations and other initiatives for reducing GHGs. Because the State does not have jurisdictional control over all of the activities that produce GHG emissions in California, the AB 32 *Scoping Plan* articulates a unique role for local governments in achieving the State's GHG reduction goals. The AB 32 *Scoping Plan* recommends that local governments establish GHG reduction goals for both their municipal operations and the community at large that are consistent with those of the State. Many jurisdictions across California, including several cities in LA County, have completed a CAP.

CARB is presently completing an update to the AB 32 *Scoping Plan,* which is expected to be adopted in late 2013.

Executive Order S-01-07—Low Carbon Fuel Standard (2007)

EO S-01-07 mandates: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020; and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.[2]

Senate Bill 375—Sustainable Communities Strategy (2008)

SB 375 provides for a new planning process that coordinates land use planning, regional transportation plans, and funding priorities in order to help California meet the GHG reduction goals established in AB 32. SB 375 requires metropolitan planning organizations (MPOs) to incorporate a "sustainable communities strategy" (SCS) in their Regional Transportation Plans (RTPs). The goal of the SCS is to reduce regional vehicle miles traveled (VMT) through land use planning and related transportation patterns. The regional targets were released by CARB in September 2010. SB 375 also includes provisions for streamlined California Environmental Quality Act (CEQA) review for some infill projects, such as transit-oriented development. The regional GHG reduction target for Southern California Association of Governments (SCAG) is an 8% per capita GHG reduction by 2020 and a conditional goal of 13% by 2035. SCAG adopted the regional RTP/SCS on April 4, 2012 (Southern California Association of Governments 2012).

California Energy Efficiency Standards for Residential and Non-Residential Buildings—Title 24 (2008), Green Building Code (2011), Title 24 Update (2014)

California has adopted aggressive energy efficiency standards for new buildings and has been continually updating them for many years. In 2008, the California Building Standards Commission adopted the nation's first green building standards, which include standards for many other aspects of the built environment besides energy efficiency. The California Green Building Standards Code

[2] The CARB approved the LCFS on April 23, 2009 and the regulation became effective on January 12, 2010 (California Air Resources Board 2011). The U.S. District Court for the Eastern District of California ruled in December 2011 that the LCFS violates the Commerce Clause of the U.S. Constitution. The CARB appealed this ruling in 2012 and on September 18, 2013, a 9th U.S. Circuit Court of Appeals panel upheld the LCFS, ruling that the program does not violate the Commerce Clause, and remanded the case to the Eastern District.

(proposed Part 11, Title 24) was adopted as part of the California Building Standards Code (24 California Code of Regulations [CCR]). Part 11 establishes voluntary standards that became mandatory in the 2010 edition of the code, including planning and design for sustainable site development, energy efficiency (in excess of the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. The voluntary standards took effect on January 1, 2011. The next update of the Title 24 energy efficiency standards was adopted in 2012 and will take effect in 2014.

California Air Resources Board Greenhouse Gas Mandatory Reporting Rule Title 17 (2009)

In December of 2007, CARB approved a rule requiring mandatory reporting of GHG emissions from certain sources, pursuant to AB 32. Facilities subject to the mandatory reporting rule must report their emissions from the calendar year 2009 and have those emissions verified by a third party in 2010. In general, the rule applies to facilities emitting more than 25,000 MT CO_2e in any given calendar year or electricity generating facilities with a nameplate generating capacity greater than 1 megawatt (MW) and/or emitting more than 25,000 MT CO_2e per year. Additional requirements also apply to cement plants and entities that buy and sell electricity in the State.

State CEQA Guidelines Update (2010)

The State CEQA Guidelines require lead agencies to describe, calculate, or estimate the amount of GHG emissions that would result from a project. Moreover, the State CEQA Guidelines emphasize the need to determine potential climate change effects of the project and propose mitigation as necessary. The State CEQA Guidelines confirm the discretion of lead agencies to determine appropriate significance thresholds, but require the preparation of an environmental impact report (EIR) if "there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with adopted regulations or requirements" (Section 15064.4).

The guidelines were updated in 2010 to address GHG emissions. State CEQA Guidelines section 15126.4 includes considerations for lead agencies related to feasible mitigation measures to reduce GHG emissions, which may include measures in an existing plan or mitigation program for the reduction of emissions that are required as part of the lead agency's decision; implementation of project features, project design, or other measures that are incorporated into the project to substantially reduce energy consumption or GHG emissions; offsite measures, including offsets that are not otherwise required, to mitigate a project's emissions; and, measures that sequester carbon or carbon-equivalent emissions.

Greenhouse Gas Cap-and-Trade Program (2013)

On October 20, 2011, CARB adopted the final cap-and-trade program for California. The California cap-and-trade program will create a market-based system with an overall emissions limit for affected sectors. The program is currently proposed to regulate more than 85% of California's emissions and will stagger compliance requirements according to the following schedule: (1) electricity generation and large industrial sources (2013); (2) fuel combustion and transportation (2015). The first auction occurred in late 2012 with the first compliance year in 2013.

Regional Regulation

South Coast Air Quality Management District

The AB 32 *Scoping Plan* does not provide an explicit role for local air districts with respect to implementing AB 32, but it does state that CARB will work actively with air districts in coordinating emissions reporting, encouraging and coordinating GHG reductions, and providing technical assistance in quantifying reductions. The ability of air districts to control GHG emissions is provided primarily through permitting, as well as through their role as a CEQA lead or commenting agency, the establishment of CEQA thresholds, and the development of analytical requirements for CEQA documents.

To provide guidance to local lead agencies for determining the significance of GHG emissions in their CEQA documents, an SCAQMD staff working group has been evaluating potential GHG CEQA significance thresholds (South Coast Air Quality Management District 2012). Members of the working group include government agencies that are implementing CEQA and representatives from various stakeholder groups that provide input to the SCAQMD staff on developing GHG CEQA significance thresholds.

On December 5, 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold of 10,000 metric tons per year for industrial permitting projects where SCAQMD is lead agency (South Coast Air Quality Management District 2008). The board letter, resolution, interim GHG significance threshold, draft guidance document, and attachments can be found under Board Agenda Item 31 on the December 5, 2008, Governing Board meeting agenda. While the working group has evaluated potential thresholds for residential, commercial, and mixed-use projects, it has neither proposed nor adopted them.

Southern California Association of Governments

SCAG is the federally designated MPO for the majority of the Southern California region, including Los Angeles County. SCAG develops regional plans for transportation, growth management, hazardous waste management, housing, and air quality. SCAG's *Compass Blueprint Growth Visioning* effort and *Two Percent Strategy* encourage concentrating regional growth, consisting of mixed-use and walkable communities with ample open space, in existing and emerging centers along transportation corridors and in transit centers. The *2012 Regional Transportation Plan/Sustainable Communities Strategy* outlines SCAG's plan for integrating transportation and land use planning in response to projected growth, housing needs, changing demographics, and transportation demands in compliance with the GHG emissions-reduction goals set forth by CARB per SB 375 (see above).

References

California Air Resources Board. 2008. *Climate Change Scoping Plan*. December. Available: <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>. Accessed: May 18, 2011.

———. 2012. *The Zero Emission (ZEV) Regulation*. January. Available: http://www.arb.ca.gov/msprog/zevprog/factsheets/general_zev_2_2012.pdf. Accessed: August 15, 2013.

South Coast Air Quality Management District. 2008. Board Meeting Date: December 5, 2008 Agenda No. 31. Available: <http://www.aqmd.gov/hb/2008/December/081231a.htm>. Accessed: July 25, 2013.

South Coast Air Quality Management District. 2012. *Greenhouse Gas (GHG) CEQA Significance Thresholds*. Last Revised: January 12, 2012. Available: <http://www.aqmd.gov/ceqa/handbook/GHG/GHG.html>. Accessed: July 25, 2013.

Southern California Association of Governments. 2012. *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy*. April.

U.S. Environmental Protection Agency. 2010. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008*. Available:<http://www.epa.gov/climatechange/emissions/usinventoryreport.html>. Accessed: May 18, 2011.

Appendix B
Inventory and Forecast Details

FINAL

UNINCORPORATED LOS ANGELES COUNTY 2010 COMMUNITY GREENHOUSE GAS INVENTORY AND FORECASTS

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May 2013
(Modified for inclusion in the CCAP, August 2015)

ICF International. 2013. *Unincorporated Los Angeles County 2010 Community Greenhouse Gas Inventory and Forecasts*. Final. May. Revised August 2015. (ICF 027920.0.004.01.) San Francisco, CA. Prepared for Los Angeles County.

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Acronyms and Abbreviations

AB	Assembly Bill
AB 32	Assembly Bill 32
AEP	Association of Environmental Professionals
AVAQMD	Antelope Valley Air Quality Management District
BAU	business-as-usual
BOD5 load	biochemical oxygen demand of wastewater during decomposition occurring over a 5-day period
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCAP	community climate action plan
CEC	California Energy Commission
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
DPW	Department of Public Works
EPA	U.S. Environmental Protection Agency
F	Fahrenheit
FOD	first order of decay
GHG	greenhouse gas
GIS	geographic information system
GSE	ground support equipment
GWP	global warming potential
HFCs	hydrofluorocarbons
ICF	ICF International
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt-hour
LA	Los Angeles
LA County	Los Angeles County
LARC	Los Angeles Regional Collaborative
LAWA	Los Angeles World Airports
LGOP	Local Government Operations Protocol

LMOP	Landfill Methane Outreach Program
MT	metric tons
N_2O	nitrous oxide
NAICS	North American Industry Classification System
NASS	U.S. Department of Agriculture's National Agricultural Statistics Service
ODS	ozone-depleting substances
Office of Sustainability	Los Angeles County Office of Sustainability
PFCs	perfluorinated carbons
Ppb	parts per billion
Ppm	parts per million
Ppt	parts per trillion
RTAC	Regional Targets Advisory Committee
RTP	Regional Transportation Plan
SCAG	Southern California Associations of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategies
SEEC	Statewide Energy Efficiency Collaborative
SF_6	sulfur hexafluoride
SONGS	San Onofre Nuclear Generation Station
SWIMS	Solid Waste Information Management System
U.S.	United States
USFS	U.S. Forest Service
UWMPs	Urban Water Management Plans
VMT	vehicle miles travelled
WWTP	wastewater treatment plant

Introduction

Climate change has emerged as an important issue at the global, national, state, and local levels. Recognizing the need for early and coordinated statewide action, the California legislature passed Assembly Bill (AB) 32, the Global Warming Solutions Act, in March 2006. AB 32 established a statewide goal to reduce greenhouse gas (GHG) emissions back to 1990 levels by 2020. This goal was developed as a near-term target in anticipation of future reduction efforts. Best available scientific data indicate that additional global action will be required after 2020 to avoid the most severe climate change effects.

The California Air Resources Board (CARB) adopted the AB 32 *Scoping Plan* as a framework for achieving the AB 32 goals in 2008. The AB 32 *Scoping Plan* outlines a series of technologically feasible and cost-effective measures to reduce statewide GHG emissions. The AB 32 *Scoping Plan* also recognizes that local governments, as opposed to the State, often have jurisdiction over activities that produce GHG emissions in California. Accordingly, the AB 32 *Scoping Plan* articulates a unique role for local governments in achieving the State's GHG reduction goals.

Los Angeles County (LA County) is acutely aware of the County's role in helping California achieve the AB 32 reduction goals. The unincorporated areas of LA County comprise more than 2,600 square miles and are home to over one million residents (2010 est.) (Los Angeles County 2012). These areas are economically and socially diverse, which presents unique challenges and opportunities for robust climate action planning. To better understand GHG emissions sources and their relative importance, the County prepared the following GHG inventories and estimates for community activities within the unincorporated County.

- Inventory of 2010 GHG emissions (2010 inventory)
- Estimated 2020 GHG emissions (2020 forecast)
- Estimated 2035 GHG emissions (2035 forecast)

This report summarizes the results of the 2010 inventory and 2020 and 2035 forecasts for unincorporated LA County.

Report Purpose

The County identified three primary objectives in preparing this report. First, the report includes an inventory of all GHG emissions that resulted from community activities within unincorporated LA County in 2010 (inventory year). The inventory also serves as a starting point for future year emissions projections, and eventually will be a foundation for climate action planning efforts.

Second, the report provides an estimate of future GHG emissions from community activities in 2020 and 2035. The emissions estimates do not take into account the majority of future GHG reduction efforts, but are forecast based on projected growth in socioeconomic and other factors for the unincorporated County. These forecasts are considered "adjusted" because they are based on the growth assumptions included in Southern California Association of Governments' (SCAG's) *2035*

Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), which are more closely aligned to the data and assumptions used to generate the *draft* General Plan build-out scenario for the General Plan Update than the *existing* General Plan build-out (i.e., the "business-as-usual" [BAU] condition). The *draft* General Plan accommodates new housing and jobs within the unincorporated area in anticipation of population growth in the County and the region. Major policies of the *draft* General Plan include encouraging walking, bicycling, and transit use; encouraging high densities and promoting mixed use; and protecting valuable habitats, employment districts, and agricultural areas.

The vehicle miles travelled (VMT) data used to forecast transportation emissions to 2020 and 2035 also account for all future planned highway and transit network improvements outlined in SCAG's 2035 RTP/SCS project list (Southern California Association of Governments 2012; Yoon pers. comm.). Although the forecasts do not represent "pure" BAU conditions, they do not account for additional State and local land use and transportation measures that may be implemented after 2010 and therefore represent a starting point for emissions reductions. Likewise, the projections can be used to develop future year emissions reduction targets.

Third, the report provides background information on the methods used to quantify the GHG inventory and adjusted emissions forecasts. Properly understanding the data, techniques, assumptions, and limitations is important for future climate action planning efforts. As the County takes steps to reduce GHG emissions within unincorporated areas, updating the emissions inventory and forecasts will be critical for tracking progress and success. Utilizing consistent methods will be important for ensuring accuracy and enabling comparisons.

Unincorporated County Community Greenhouse Gas Emissions

GHG emissions from "community activities" include those occurring due to activities within the jurisdictional boundaries of unincorporated LA County, including some emissions that occur outside of the unincorporated County that are related to activities inside the County. This inventory focuses on community emissions most readily under the control or subject to the influence of the County. For direct emissions (such as natural gas combustion in buildings), if the County can have a substantial effect on those emissions by influencing energy use (such as through green building codes), then the direct emissions are included in the inventory. For indirect emissions (such as solid waste disposed outside of the County), if the County can have a substantial effect on those indirect emissions by influencing demand (such as waste minimization and diversion programs), then they are included in the inventory. By including emissions that are controlled by or subject to the influence of the County, the inventory can form the basis for local climate action planning.

Emissions generated by all jurisdictions within LA County are encapsulated in a separate effort led by the Los Angeles Regional Collaborative (LARC) for Climate Action and Sustainability that will be released separately by the LARC. GHG emissions associated with the County's municipal operations are currently undergoing separate evaluation and reduction planning efforts.

As noted above, the County inventoried GHG emissions generated by community activities in 2010 and forecasted those emissions to 2020 and 2035. The analysis utilized methodologies and procedures used by federal, state, and local air quality management agencies, as well as those commonly used in developing greenhouse gas emissions for local jurisdictions. The 2010 emissions

inventory represents the "existing" emissions level for the community climate action plan (CCAP). The 2020 and 2035 emissions projections are predictions of how community emissions may change in the absence of State and local actions to reduce GHGs. The forecasts are based on expected growth in unincorporated County population, employment, and housing.

The GHG inventory and emissions forecasts are presented in metric tons (MT) of carbon dioxide equivalent (CO_2e). Presenting inventories in CO_2e allows one to characterize the complex mixture of GHGs as a single unit and accounts for the unique global warming potential (GWP) of each gas. Emissions results are provided for the entire unincorporated County.

Emissions Inventory (2010)

Table ES-1 and Figure ES-1 summarize total GHG emissions for unincorporated LA County by emissions source. Emissions included in the inventory are direct emissions, such as the combustion of natural gas for heating, and indirect emissions, such as the GHG emissions from electricity generation, which typically occur outside the inventory area but are influenced by electricity consumption within the County.

Electricity emissions from water supply, treatment, and distribution are not presented separately from other emission sources in the inventory because they are already included in the building energy sector under "Commercial/Industrial Electricity." However, these emissions are disclosed as an individual line item for informational purposes. Unlike traditional emissions sources, urban and natural forests are considered emissions sinks because they naturally remove CO_2 from the atmosphere. Natural forests are part of the natural carbon cycle, and thus it is inappropriate to count them as an "offset" against anthropogenic emissions sources. The ICLEI U.S. Community Protocol (ICLEI 2012) recommends that carbon sequestration not be added to inventories of anthropogenic emissions but disclosed separately, which is what this inventory does. Accordingly, urban and natural forests are disclosed in this inventory but are not combined with the anthropogenic emissions in GHG inventory. Expansion of urban and natural forests is sometimes quantified as part of local climate action planning, but that quantification would apply to planned new forested areas, as opposed to existing ones. Finally, in some cases, urban and natural forests within a jurisdiction may not be under the control of the County, such as in the case of a regional or national park.

Table ES-1. 2010 GHG Inventory for Unincorporated LA County by Sector (MT CO_2e)

Emissions Sector	2010 Emissions	Percent of Inventory
Included Emissions		
Residential Natural Gas	678,438	8.5%
Residential Electricity	586,515	7.3%
Commercial/Industrial Natural Gas	246,954	3.1%
Commercial/Industrial Electricity	2,394,306	30.0%
Large Industrial Sources	219	0.0%
Small Industrial Sources	1,064	0.0%
On-Road Transportation	3,359,231	42.1%
Off-Road Transportation and Equipment	24,480	0.3%
Solid Waste	535,148	6.7%
Wastewater Treatment	29,885	0.4%
Water Conveyance	96,189	1.2%
Agriculture	30,290	0.4%
Total Emissions [a]	*7,982,720*	*100.0%*
Emissions for Informational Purposes [b]		
Water Supply, Treatment, and Distribution [c]	40,406	-
Urban and Natural Forests Sequestration [d]	-48,312	-
National and State Forests Sequestration [e]	-896,380	-
Total Informational Emissions [a]	-904,286	-

Notes:

[a] Values may not sum due to rounding.

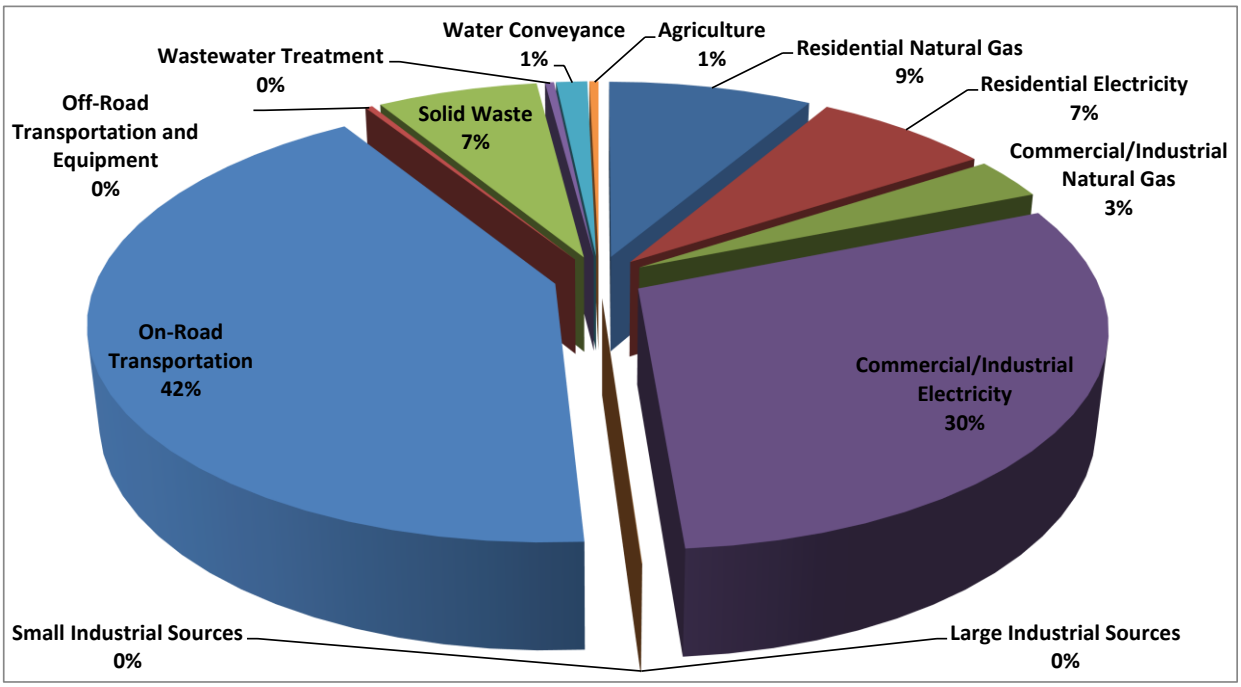
[b] Additional emissions sources that were not estimated (or included in the inventory) include the military, marine ships, aircraft, public transit, freight rail, non-local passenger rail, Los Angeles World Airports (LAWA) activities, the ports of Los Angeles and Long Beach, ozone depleting substances, and other high global warming potential gases. Emissions associated with LAWA activities, such as building energy use and off-road equipment, were either included in other sectors of the inventory or were not included due to data and modeling limitations.

[c] Includes electricity used to pump groundwater (supply), treat water in water treatment plants (treatment), and pump water to the cities (distribution). Most or all of this electricity is likely already included in the building energy sector under Commercial/Industrial Electricity so a separate line item is not shown in the inventory total proper. However, the estimated emissions were quantified separately for later use in climate action planning.

[d] Includes urban trees and natural forest within the County. The ICLEI U.S. Community Protocol (2012) recommends that sequestration emissions not be added to inventories of anthropogenic emissions but disclosed separately.

[e] Includes forests in national parks and national forests.

Figure ES-1. 2010 GHG Inventory for Unincorporated LA County by Sector (MT CO_2e)



Total emissions in 2010 were 7,982,720 MT CO_2e, approximately 1.8% of California's GHG emissions in 2010.[1] In 2010, the top three sources of emissions in unincorporated LA County were:

- Building energy use[2]
- On-road transportation
- Solid waste

Total GHG emissions in the building energy sector in 2010 were 3,906,213 MT CO_2e, which represents 49% of total unincorporated emissions (Table ES-1). Building energy is often one of the largest sources of GHG emissions in community inventories and includes residential, commercial, and industrial components. Emissions result from energy consumed to heat, cool, and light buildings, and from natural gas used for cooking.

Total GHG emissions from on-road transportation were 3,359,231 MT CO_2e in 2010, which represents 42% of total unincorporated emissions. On-road transportation is typically a considerable component of a community's total GHG emissions, ranging from 30% to 70%, depending upon other sources and local conditions. Statewide on-road transportation emissions are approximately 40% of total emissions in California. [3]

[1] Statewide GHG emissions in 2010 were 449.59 million MTCO_2e (California Air Resources Board 2013).

[2] Includes electricity and natural gas use in residential, commercial and industrial buildings

[3] Of the total 2010 transportation emissions in California, light-duty vehicles (passenger cars, light-duty trucks and SUVs, and motorcycles) account for 71% of emissions (27% of statewide emissions); heavy-duty trucks, buses, and motorhomes account for 21% of emissions (8% of statewide emissions); and other transportation modes (aviation, rail, water-borne, and not-specified) account for the remaining 8% of emissions (3% of statewide emissions),

Total GHG emissions from solid waste were 535,148 MT CO_2e in 2010, which represents 7% of total unincorporated emissions. For some communities, solid waste emissions represent a small component of the GHG footprint, but in others, they can be substantial, depending on the amount of waste disposal and the specific characteristics of nearby landfills.

Additional sources of GHG emissions in the County include off-road transportation and equipment; agriculture; water treatment and conveyance; and wastewater treatment.

2020 and 2035 Emissions Forecasts

The 2020 and 2035 adjusted forecasts for unincorporated LA County are summarized in Table ES-2. As discussed above, the forecasts are considered "adjusted" because they are more closely aligned with the *draft* General Plan than the *existing* General Plan (i.e., the true BAU condition).

Emissions forecasts for electricity-related emissions taken into account the recent closure of the San Onofre Nuclear Generation Station (SONGS). SONGS was a nuclear power plant that generated carbon-free electricity for Southern California Edison (SCE) in 2010 (the inventory year). The facility was permanently shut down in 2013, requiring the reinstatement of several natural gas plants and dramatically altering SCE's power mix.

While the SONGS closure does not affect conditions in place during the inventory year, forecasting 2020 and 2035 electricity-related emissions based on SCE's 2010 carbon intensity, which includes nuclear energy, requires an assumption regarding the replacement of SONGS with either a) other carbon-free sources, b) non-renewable sources such as natural gas or coal, or c) a combination of both carbon-free and non-renewable sources.

The California Public Utilities Commission (CPUC) approved a final decision (Rulemaking 12-03-014) regarding the long-term procurement for local capacity requirements due to the permanent retirement of SONGS in March 2014.[4] The decision outlines a strategy that would replace electricity generated by SONGS with a range of renewable, energy storage, natural gas, and other resources. The decision allows for procurement flexibility of renewable/energy storage that ranges between 40% and 60%. For the purposes of this analysis, a midpoint between the range of 50% renewable/energy storage and 50% natural gas (including "other resources") was used. Therefore, electricity-related emissions were forecasted to 2020 and 2035 assuming that SONGS would be replaced by 50% renewable and 50% natural gas resources.

As shown in Table ES-2, adjusted emissions are expected to increase throughout the community by approximately 13% from 2010 to 2020 and by 32% from 2010 to 2035. These increases will occur primarily because of increases in VMT, building energy use, and off-road equipment. As the population and employment in unincorporated LA County grow, transportation activity and energy consumption will increase. Likewise, off-road equipment emissions will increase as a result of increased development and construction activity. The assumed replacement of SONGS with 50% natural gas power also contributes to the forecasted increase in building energy emissions.

[4] See http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M088/K979/88979084.PDF.

Table ES-2. 2020 and 2035 Adjusted GHG Emissions Forecasts for Unincorporated LA County by Sector (MT CO_2e) [a]

	2020 Adjusted Forecast		2035 Adjusted Forecast		Change from 2010	
Emissions Sector	Emissions	% of Inventory	Emissions	% of Inventory	2020	2035
Included Emissions						
Residential Natural Gas	738,376	8%	880,665	8%	9%	30%
Residential Electricity	724,192	8%	863,378	8%	23%	47%
Commercial/Industrial Natural Gas	270,466	0%	323,657	3%	10%	31%
Commercial/Industrial Electricity	2,975,309	33%	3,559,697	34%	24%	49%
Large Industrial Sources	237	0%	269	0%	8%	23%
Small Industrial Sources	1,152	0%	1,306	0%	8%	23%
On-Road Transportation	3,657,532	40%	4,208,180	40%	9%	25%
Off-Road Transportation and Equipment	26,797	0%	32,058	0%	9%	31%
Solid Waste	500,952	6%	482,258	5%	-6%	-10%
Wastewater Treatment	32,526	0%	38,793	0%	9%	30%
Water Conveyance	97,788	1%	115,824	1%	2%	20%
Agriculture	30,141	0%	29,948	0%	0%	-1%
Total Emissions[b]	*9,055,469*	*100%*	*10,536,035*	*100%*	*13%*	*32%*
Emissions for Informational Purposes [c]						
Water Supply, Treatment, and Distribution [d]	43,120	-	50,316	-	7%	25%
Urban and Natural Forests [e]	-44,418	-	-34,998	-	-8%	-28%
National and State Forests [f]	-896,380	-	-896,380	-	0%	0%
Total Informational Emissions [a]	-897,679		-881,062		-1%	-3%

Notes:

[a] The emissions estimates do not take into account the majority of future GHG reduction efforts, but are forecast based on projected growth in socioeconomic and other factors. The forecasts are considered "adjusted" because they are more closely aligned to the data and assumptions used to generate the draft General Plan build-out scenario for the General Plan Update rather than the existing General Plan build-out and therefore do not represent a "business-as-usual" scenario. The VMT data used to forecast transportation emissions also assume implementation of the SCAG's 2012 RTP, including workplace TDM and land use strategies that will contribute to emissions reductions. Finally, the building energy sector assumes that power generated by SONGS under the inventory year (2010) would be replaced with power generated by 50% renewable and 50% natural gas resources.

[b] Values may not sum due to rounding.

[c] Emissions are presented for informational purposes only.

[d] Includes electricity used to pump groundwater (supply), treat water in water treatment plants (treatment), and pump water to the cities (distribution). Most or all of this electricity is likely already included in the building energy sector under Commercial/Industrial Electricity so a separate line item is not shown in the inventory total proper. However, the estimated emissions were quantified separately for later use in climate action planning.

[e] Includes urban trees and natural forests within the County. The ICLEI U.S. Community Protocol (2012) recommends that sequestration emissions not be added to inventories of anthropogenic emissions but disclosed separately.

[f] Includes forests in national parks and national forests.

Total emissions for unincorporated LA County in 2020 are projected to reach 9,055,469 MT CO_2e, approximately 1.7% of California's 2020 BAU emissions forecast.[5] Emissions within unincorporated LA County are expected to increase to 10,536,035 MT CO_2e by 2035. Emissions trends are similar to the 2010 inventory, with building energy use,[6] on-road transportation, and solid waste representing the top three sources of emissions.

GHG emissions from building energy use are expected to increase from 3,906,213 MT CO_2e to 4,708,344 MT CO_2e, or by 21% between 2010 and 2020. A similar rate of increase is expected through 2035, resulting in a 20% increase in emissions relative to 2020 (5,627,397 MT CO_2e). Commercial and industrial electricity use is expected to produce the largest increase in emissions, followed by residential electricity use and natural gas consumption.

GHG emissions from on-road transportation are expected to increase from 3,359,231 MT CO_2e in 2010 to 3,657,532 MT CO_2e in 2020. This represents a 9% increase in emissions over inventory year conditions. Emissions are expected to reach 4,208,180 MT CO_2e by 2035. These trends are driven by the light/medium duty sector, supplemented with rapid growth in heavy-duty vehicle miles traveled. Emissions generated by heavy-duty vehicles are expected to increase the fastest of all emissions sectors included in the forecast: 34% between 2010 and 2020 and 72% between 2010 and 2035. Unlike other sectors in the adjusted forecast, VMT data provided for 2020 and 2035 also account for some future planned highway and transit network improvements outlined in SCAG's 2035 RTP/SCS that will contribute to VMT and GHG emissions reductions. Because the transportation analysis accounts for some VMT reductions associated with the 2035 RTP/SCS, the emissions forecast for the on-road transportation sector likely underestimates actual emissions under a true BAU scenario.

GHG emissions from solid waste management are projected to decrease in both the 2020 and 2035 adjusted forecasts. Between 2010 and 2020, emissions are expected to decline by 34,196 MT CO_2e (-6%); between 2010 and 2035, emissions are reduced by 52,890 MT CO_2e (-10%). This trend is a result of improvements in methane capture rate (1% increase) and historic waste disposal trends.

All other sectors except agriculture (off-road transportation and equipment; water treatment and conveyance; and wastewater treatment) are expected to increase in emissions, relative to the 2010 inventory. Agriculture emissions are expected to decreases slightly. This trend is a result of reductions in agriculture activity.

GHG Monitoring

Major emissions sources and expected GHG trends are identified in this report. Data and methods used to quantify the 2010 emissions inventory and estimate the 2020 and 2035 adjusted forecasts are also presented. As the County takes steps to reduce GHG emissions within unincorporated areas, updating the emissions inventory and forecasts will be critical for tracking progress and success. Regular GHG monitoring can also help identify effective strategies and potential issues, which will help the county make more informed decisions on future priorities, funding, and scheduling.

[5] Statewide GHG emissions in 2020 are estimated at 544.78 million $MTCO_2e$ (California Air Resources Board 2013).

[6] Includes electricity and natural gas use in residential, commercial and industrial buildings

The Community Climate Action Plan prepared for the unincorporated County will articulate protocols for monitoring GHG emissions. Numerous protocols and tools are available to the County, such as the ICLEI U.S. Community Protocol (2012) for community inventories, Local Government Operations Protocol (LGOP) for municipal inventories (California Air Resources Board et al. 2010), California Community-Wide Greenhouse Gas Baseline Inventory Protocol White Paper by the Association of Environmental Professionals (AEP) (Association of Environmental Professionals 2011), and the Statewide Energy Efficiency Collaborative (SEEC) Community Inventory Tool (Statewide Energy Efficiency Collaborative 2012).

Report Organization

The unincorporated County emissions inventory and forecasts documented in this report are presented in the following six chapters.

- Chapter 1, *Background Information*
- Chapter 2, *Inventory and Forecast Results by Emissions Sector*
- Chapter 3, *Methodology*
- Chapter 4, *Recommendations for Future Inventories*
- Chapter 5, *References*

The first chapter provides background information on unincorporated LA County. Chapter 2 presents the results of the 2010 emissions inventory and 2020 and 2035 adjusted forecasts. Chapter 3 discusses the procedures that were used to calculate GHG emissions, including standard protocols, emission factors, and methodologies. Chapter 4 provides recommendations for preparing future emissions inventories for the LA County Region. Document references are listed in Chapter 5.

Chapter 1
Background Information

Greenhouse gas (GHG) emissions are directly correlated with the geography, climate, demographics, economy, and character of a community. Further, projections of GHG emissions reflect community growth with respect to future housing, jobs and infrastructure. Understanding the unique characteristics of unincorporated Los Angeles (LA) County is therefore critical to the GHG analysis presented in this report. A brief overview of unincorporated LA County is presented in this section. General concepts and terminology used throughout the document are also defined. Finally, background information on the science of climate change, is provided at the conclusion of the chapter.

County Overview

As the most populous county within the nation, LA County is economically, socially, and geographically diverse. Unincorporated areas, which comprise approximately 65% of the total land area within the County, range from national forests and deserts to densely populated communities.

Weather within the region is characterized by a Mediterranean climate and is susceptible to areas of microclimates, especially between the coastal and inland areas. Mild to hot and dry summers with temperatures ranging from 69° Fahrenheit (F) at the coast to 83°F inland are common. Likewise, mild, rainy conditions with temperatures ranging from 43°F inland to 56°F at the coast are typical in the winter months (Western Regional Climate Center 2009).[7]

Approximately 1 million people live in the unincorporated areas of LA County, which is about one-tenth of the total County population. The majority of these reside in suburban communities, although rural residences are scattered throughout the County. Economic activity is highly diverse. In 2010, education and health accounted for 28% of jobs, while leisure-hospitality, professional-management, manufacturing, and retail industries together accounted for 41% of all jobs. Public administration, construction, wholesale, transportation, and finance made up 3% or more of the total jobs (Southern California Association of Governments 2011).

The diversity of land uses within the County presents both challenges and opportunities for long-range development. To facilitate planning of all unincorporated areas, the General Plan divides LA County into the following 11 planning areas. Figure 1-1 provides the geographic boundaries of the planning areas within LA County. For more detailed information on these regions, please refer to the General Plan.[8]

- Antelope Valley
- Coastal Islands
- East San Gabriel

[7] These are monthly average temperatures for the months indicated. Coastal temperatures are represented by Western Regional Climate Center climate data for Santa Monica. Inland temperatures are represented by Western Regional Climate Center data for Lancaster.

[8] http://planning.lacounty.gov/generalplan/draft

- Gateway
- Metro
- San Fernando Valley
- Santa Clarita Valley
- Santa Monica Mountains
- South Bay
- West San Gabriel Valley
- Westside

Figure 1-1. LA County Planning Areas

Socioeconomic Data and Growth Forecasts

As shown in Table 1-1, population within unincorporated LA County is anticipated to increase by 9% between 2010 and 2020 and by 30% between 2010 and 2035. Aggressive growth in housing and employment is likewise expected for unincorporated LA County, with homes and jobs each increasing by about 10% between 2010 and 2020.

Report Definitions and Terminology

The following section explains important definitions and terminology used in this report.

Adjusted Forecast: The "adjusted" forecast represents a future scenario that does not consider the possible reduction of GHG emissions that may result from the majority of actions after the inventory or "existing" year. This adjusted forecast is based on socioeconomic data provided by the Southern California Association of Governments (SCAG) and utilized in its *2035 Regional Transportation Plan/Sustainable Communities Strategy* (RTP/SCS). This data for 2020 and 2035 is more closely aligned to the County's *draft* General Plan assumptions than those in the *existing* General Plan; therefore, it is not a true BAU forecast.

The transportation sector is an exception in that it does account for the possible reduction of GHG emissions that may result from actions after the inventory year. Specifically, the vehicle miles travelled (VMT) data used to forecast transportation emissions to 2020 and 2035 accounts for all of the highway and transit projects outlined in SCAG's 2035 RTP/SCS project list (Southern California Association of Governments 2012; Yoon pers. comm.). The SCAG 2035 RTP/SCS includes SCAG's plans for integrating the transportation network and related strategies with the overall land use pattern. The SCAG 2035 RTP/SCS supports and complements the proposed transportation network and emphasizes system preservation, active transportation, and transportation demand management measures. The measures and projects outlined in the SCAG 2035 RTP/SCS will enhance traffic operations in the SCAG region and contribute to emissions reductions in the transportation sector.

Community Inventory: The community inventory includes GHG emissions occurring in association with the land uses within unincorporated County's jurisdictional boundaries, and generally consists of sources of emissions that the community can influence or control. The inventory includes emissions that occur both inside and outside the jurisdictional boundaries, but only to the extent that such emissions are due to land uses and activities within the unincorporated County.

Emissions Type: GHG emissions can be defined as either direct (emissions that occur at the end use location, such as natural gas combustion for building heating) or indirect (emissions that result from consumption at the end use location but occur at another location, such as emissions from residential electricity use that occur at the power plant itself but result from in-home appliance or other use). This report addresses both types of emissions. In this report, the term *emission* refers to GHG emissions and not to emissions of criteria or toxic air pollutants.

Unit of Measure: The unit of measure used throughout this GHG inventory is the metric ton (MT) of carbon dioxide equivalent (CO_2e). Presenting inventories in CO_2e allows one to characterize the complex mixture of GHG as a single unit, taking into account that each gas has a different global warming potential (GWP).

Table 1-1. 2010, 2020, and 2035 Population, Housing, and Employment Statistics for Unincorporated LA County

	Population			Households			Employment		
Metric	2010	2020	2035	2010	2020	2035	2010	2020	2035
Value	1,064,595	1,158,648	1,381,927	304,054	334,721	403,762	241,427	264,412	316,413
Growth Rate from 2010	-	1.09	1.30	-	1.10	1.33	-	1.10	1.31

Source: Ryu personal communication 2013

The Science of Climate Change

Global Warming

Climate change is a term used to describe large-scale shifts in existing (i.e., historically observed) patterns in earth's climate system. Although the climate has historically responded to natural drivers, recent climate change has been unequivocally linked to increasing concentrations of GHGs in the earth's lower atmosphere and the rapid timescale on which these gases have accumulated (Intergovernmental Panel on Climate Change 2007a). The rapid loading of GHGs into the atmosphere is due to the burning of fossil fuels since the industrial revolution.

Higher concentrations of heat-trapping GHGs in the atmosphere result in increasing global surface temperatures, a phenomenon commonly referred to as *global warming*. In the absence of anthropogenic (i.e., created by humans) emissions, GHGs play a critical role in maintaining the earth's temperature for successful habitation by humans and other forms of life.

Increases in fossil fuel combustion and deforestation have exponentially increased concentrations of GHGs in the atmosphere since the industrial revolution. Rising atmospheric concentrations of GHGs in excess of natural levels have increased global surface temperatures, which in turn result in changes to the earth's climate system. Warming of the earth's lower atmosphere is predicted to induce large-scale changes in planetary systems, including ocean circulation patterns, precipitation patterns, global ice cover, and biological distributions (Intergovernmental Panel on Climate Change 2007a, 2007b). Some of the above changes will result in specific impacts at the State and local level.

The Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC identifies carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorinated carbons (PFCs), sulfur hexafluoride (SF_6), and hydrofluorocarbons (HFCs) as key GHGs (Intergovernmental Panel on Climate Change 2007a). Each is discussed in detail below.

To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method to compare GHG emissions is the GWP methodology defined in the IPCC reference documents. The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of CO_2e, which compares the gas in question to that of the same mass of CO_2, which has a global warming potential of 1 by definition.

Table 1-2 lists the global warming potential of CO_2, CH_4, N_2O, PFCs, SF_6, and HFCs; their lifetimes; and abundances in the atmosphere.

Table 1-2. Lifetimes and Global Warming Potentials of Several Greenhouse Gases

Greenhouse Gases	Global Warming Potential (100 years)	Lifetime (years)	Current Atmospheric Abundance [b]
CO_2 (ppm) [a]	1	50–200	393
CH_4 (ppb)	25	12	1,874
N_2O (ppb)	298	114	324
CF_4 (ppt) [a]	7,390	50,000	n/a
C_2F_6 (ppt) [a]	12,200	10,000	n/a
SF_6 (ppt)	22,800	3,200	7.5
HFC-23 (ppt)	14,800	270	n/a
HFC-134a (ppt)	1,430	14	68
HFC-152a (ppt)	124	1.4	n/a

Sources: Intergovernmental Panel on Climate Change 2007a.

Notes: ppm = parts per million
ppb = parts per billion
ppt = parts per trillion

CF_4 and C_2F_6 are PFCs

CO_2 concentration is from National Oceanic & Atmospheric Administration (2013); all other values are from Blasing (2013)

Principal Greenhouse Gases

Carbon Dioxide

CO_2 is the most important anthropogenic GHG and accounts for more than 75% of all GHG emissions caused by humans. Its atmospheric lifetime of 50–200 years ensures that atmospheric concentrations of CO_2 will remain elevated for decades even after efforts to reduce GHG concentrations are promulgated (Intergovernmental Panel on Climate Change 2007a). The primary sources of anthropogenic CO_2 in the atmosphere include the burning of fossil fuels (including motor vehicles), gas flaring, cement production, and land use changes (e.g., deforestation, oxidation of elemental carbon). CO_2 can be removed from the atmosphere by photosynthetic organisms.

Atmospheric CO_2 has increased from a pre-industrial concentration of 280 parts per billion (ppb) to 393 parts per million (ppm) in 2013 (Intergovernmental Panel on Climate Change 2007b and National Oceanic and Atmospheric Administration 2013).

Methane

CH_4, the main component of natural gas, is the second most abundant GHG and has a GWP of 25 (Intergovernmental Panel on Climate Change 2007a). Sources of anthropogenic emissions of CH_4 include growing rice, raising cattle, using natural gas, landfill outgassing, and mining coal (National Oceanic and Atmospheric Administration 2005). Certain land uses also function as a both a source and sink for CH_4. For example, the primary terrestrial source of CH_4 are wetlands, whereas undisturbed, aerobic soils act as a CH_4 sink (i.e., they remove CH_4 from the atmosphere).

Atmospheric CH_4 has increased from a pre-industrial concentration of 715 ppb to 1,874 ppb in 2013 (Intergovernmental Panel on Climate Change 2007b; Blasing 2013).

Nitrous Oxide

N_2O is a powerful GHG, with a GWP of 298 (Intergovernmental Panel on Climate Change 2007a). Anthropogenic sources of N_2O include agricultural processes (e.g., fertilizer application), nylon production, fuel-fired power plants, nitric acid production, and vehicle emissions. N_2O also is used in rocket engines, racecars, and as an aerosol spray propellant. Natural processes, such as nitrification and denitrification, can also produce N_2O, which can be released to the atmosphere by diffusion. In the United States more than 70% of N_2O emissions are related to agricultural soil management practices, particularly fertilizer application.

N_2O concentrations in the atmosphere have increased 18% from pre-industrial levels of 270 ppb to 324 ppb in 2013 (Intergovernmental Panel on Climate Change 2007b; Blasing 2013).

Perfluorinated Carbons

The most abundant PFCs are CF_4 (PFC-14) and C_2F_6 (PFC-116). These anthropogenic chemicals are emitted largely from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are destroyed only by very high-energy ultraviolet rays, which results in a very long chemical lifetime.

Sulfur Hexafluoride

SF_6, an anthropogenic chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, in semiconductor manufacturing, and also as a tracer chemical for the study of oceanic and atmospheric processes (U.S. Environmental Protection Agency 2006). In 2010, atmospheric concentrations of SF_6 were 7.4 parts per trillion (ppt) and steadily increasing in the atmosphere. SF_6 is the most powerful of all GHGs listed in IPCC studies, with a GWP of 22,800 (Intergovernmental Panel on Climate Change 2007a).

Hydrofluorocarbons

HFCs are anthropogenic chemicals used in commercial, industrial, and consumer products and have high GWPs (U.S. Environmental Protection Agency 2006). HFCs are generally used as substitutes for ozone-depleting substances (ODS) in automobile air conditioners and refrigerants. As seen in Table 1-2, the most abundant HFCs, in descending order, are HFC-134a, HFC-23, and HFC-152a.

Greenhouse Gas Inventories and Emissions Sources

A GHG inventory is a quantification of all GHG emissions and sinks within a selected physical and/or economic boundary. GHG inventories can be performed on a large scale (i.e., for global and national entities) or on a small scale (i.e., for a particular building or person). Although many processes can be challenging to evaluate, several government and nongovernment bodies have developed tools and protocols to quantify emissions from many sources.

Over the last several decades, private and public entities including states, nations, cities, corporations, and universities, have sought to understand their GHG emissions and identify ways to decrease their carbon footprint. The first step in this process is the completion of a GHG inventory, essentially an audit of all sources of GHG emissions within a given boundary (jurisdictional,

geographical, or some combination of the two) and an assessment of their magnitude. Protocols and procedures exist for conducting a GHG inventory[9]—these are described in Chapter 3, *Methodology*. Since 2006 when AB 32 was signed into law, many local governments in California have completed a community GHG inventory. Because AB 32 establishes the year 2020 as the target year by which California should reduce its emissions, many communities in California are choosing to prepare a GHG forecast for the year 2020 in addition to their base year inventory.

LA County, with assistance from ICF International (ICF), has developed the following GHG inventories and estimates for community activities within the unincorporated areas. Emissions for a particular source were included in the inventory if either the source of emissions occurs within the geographic boundaries of the unincorporated County, or if the activity indirectly associated with a source of emissions occurs within the geographic boundaries of the unincorporated County (such as electricity consumption or waste disposal).

The 2010 inventory is based mostly on actual 2010 activity data (estimates were used for activity data in a few sectors) and year 2010 emission factors and includes all significant sectors contributing to GHG emissions, according to the guidelines of the CARB Local Government Operations Protocol (LGOP) (2010).This inventory was developed with sufficient detail to support identification of GHG reduction measures.

Global, National, and Statewide GHG Inventories

The majority (83%) of U.S. GHG emissions are the result of burning fossil fuels. Fossil fuels are burned to create electricity that powers homes, commercial buildings, and vehicles. Energy used to power buildings is a primary source of GHGs in the U.S. and California. Vehicle emissions follow a close second, comprising approximately 30% of total national emissions and 37% of total statewide emissions (U.S. Environmental Protection Agency 2010; California Air Resources Board 2010). Other sources of GHG emissions include agriculture, land clearing, waste landfills, refrigerants, and certain industrial processes.

Table 1-3 displays the most recent global, national, and statewide GHG inventories to help contextualize the magnitude of LA County's GHG emissions.

Table 1-3. Global, National, State, and Local GHG Emissions Inventories

Emissions Inventory	CO_2e (metric tons)
2004 IPCC Global GHG Emissions Inventory	49,000,000,000
2010 EPA National GHG Emissions Inventory	6,821,800,000
2010 CARB State GHG Emissions Inventory	449,590,000
Sources: Intergovernmental Panel on Climate Change 2007a; U.S. Environmental Protection Agency 2012; California Air Resources Board 2013.	

[9] No standard protocols and procedures currently exist for a community GHG inventory at the county or city scale. Current protocols cover municipal operations or national-level inventories.

Chapter 2
Inventory and Forecast Results by Emissions Sector

This section presents the 2010 inventory and the 2020 and 2035 adjusted forecasts for unincorporated LA County. The results of the 2010 community inventory and the 2020 and 2035 adjusted forecasts are presented in Tables ES-1 through ES-2. Each subsection below describes a different sector of the inventory. Introductory information for each sector is followed by emissions results.

This chapter does not include an analysis of GHG emissions associated with the Coastal Islands Planning Area. Due to data limitations, the Coastal Islands Planning Area was excluded from the 2010 inventory and 2020 and 2035 adjusted forecasts. This data limitation is discussed further in Chapter 4, *Recommendations for Future Inventories*.

Building Energy Use

Building energy consumption includes electricity and natural gas usage. Electricity use in buildings results in indirect emissions from the power plants that produce the electricity. Natural gas consumption by furnaces and other appliances in buildings results in direct emissions where the natural gas is combusted. Building energy use emissions are generally a function of the number of residents, types and ages of buildings, composition of the power supply, and the number of employees.

Table 2-1 presents the 2010 emissions inventory and 2020 and 2035 adjusted forecasts for building energy use. As shown in Table 2-1, building energy use from residential, commercial, and industrial buildings and use is the largest component of the unincorporated County inventory, accounting for 49% of total emissions in 2010 (3,906,213 MT CO_2e). Emissions are expected to increase by 21% between 2010 and 2020 and by 44% between 2010 and 2035. Increases in electricity and natural gas consumption as a result of population and employment growth underpin much of this trend. However, the assumed replacement of SONGS with 50% renewables and 50% natural gas power also contributes to the forecasted increase in building energy emissions.

Table 2-1. Building Energy GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast

Analysis Year	MT CO_2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	3,906,213	49%	-
2020 Adjusted Forecast	4,708,344	52%	21%
2035 Adjusted Forecast	5,627,397	53%	44%

Stationary Sources

This source includes emissions from stationary (typically industrial) combustion of fossil fuels and fugitive emissions from industrial processes. Emissions for large industrial facilities include natural

gas combustion. These natural gas emissions partially overlap with the building energy sector (discussed above), since natural gas was included in the data provided by the utilities. Note that large stationary sources are regulated by the State of California (under AB 32 through cap-and-trade) and EPA (under the Clean Air Act). Smaller stationary sources are often, but not always, regulated by federal and State agencies and the South Coast Air Quality Management District (SCAQMD).

The only facility located in the unincorporated County that reported emissions to EPA for 2010 was the Calabasas Sanitary Landfill.[10] Stationary fuel use for all other sources was obtained from the SCAQMD.

To avoid double-counting with indirect electricity emissions, fuel use for electricity generation is not included in the stationary sources inventory. As electricity is provided through an integrated electricity grid, the emissions are derived from electricity generated by sources that are both within and outside Los Angeles County; the inventory quantifies emissions based on electricity consumption in the County, rather than by the production of that electricity.

Table 2-2 summarizes emissions estimates for the 2010 inventory and 2020 and 2035 adjusted forecasts.

Table 2-2. Stationary Source GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast (MT CO_2e)

Analysis Year	MT CO_2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	1,283	0.02%	-
2020 Adjusted Forecast	1,390	0.02%	8%
2035 Adjusted Forecast	1,575	0.01%	23%

On-Road Transportation

On-road transportation includes emissions from two sources: light/medium-duty vehicles and heavy-duty trucks. Emissions generated by vehicles traveling on County roadways result from the combustion of fossil fuels (such as diesel, gasoline, compressed natural gas, etc.). Consistent with the statewide Regional Targets Advisory Committee (RTAC) recommendations, VMT were calculated using the transportation origin/ destination modeling methodology. This methodology calculates daily VMT by 5 mile-per-hour speed increments and accounts for the three following types of vehicle trips.

[10] Emissions from this landfill only include stationary fuel combustion; fugitive methane emissions from waste decomposition in the landfill are included in the solid waste management sector of the inventory.

1. Vehicle trips that originated and terminated within the unincorporated County
2. Vehicle trips that either originated or terminated (but not both) within the unincorporated County
3. Vehicle trips that neither originated nor terminated within the unincorporated County. These trips are commonly called pass-through trips.

Using the "accounting rules" established by RTAC, VMT from the trips of type 1, 2, and 3 were weighted by 1, 0.5, and 0 respectively towards jurisdiction-generated VMT. Please note that VMT associated with transit vehicles (e.g., LA Metro) were not included in the unincorporated inventory. VMT data for public transit buses was not available at the time of this inventory report. The Regional Inventory quantifies transit emissions on a County or regional level based on fuel consumption. It is important to note that LA Metro's sustainability goals, which include maximizing alternative fuels and efficiency, will contribute to long-term emissions reductions in the public transit sector. For additional information on the transit sector, please refer to the Regional Inventory.

Table 2-3 presents VMT and GHG emissions estimates for light/medium-duty vehicles and heavy-duty vehicles. Table 2-4 presents total on-road transportation emissions for all analysis years. As shown in Table 2-4, total emissions generated by on-road vehicles accounted for approximately 42% of total unincorporated emissions in 2010 (3,359,231 MT CO_2e).

Emissions are expected to increase by 9% between 2010 and 2020 and by 25% between 2010 and 2035. As discussed previously, the VMT data provided for 2020 and 2035 account for some future planned highway and transit network improvements outlined in SCAG's 2035 RTP/SCS. It is difficult to estimate VMT without the highway and network assumptions since the specific parameters/ variables are embedded in the transportation model. Because the transportation analysis accounts for some VMT reductions associated with the 2035 RTP/SCS, the emissions forecast for the on-road transportation sector likely underestimates actual emissions under a true BAU scenario.

Table 2-3. Light/Medium-Duty Annual VMT and GHG Emissions for Unincorporated LA County [a]

	Light/Medium Duty Vehicles		Heavy-Duty Vehicles	
Analysis Year	VMT	MT CO_2e	VMT	MT CO2e
2010 Inventory	6,778,823,082	3,016,366	335,798,280	342,865
2020 Adjusted Forecast	7,322,209,100	3,196,817	424,847,521	460,715
2035 Adjusted Forecast	8,325,028,723	3,618,992	535,812,810	589,188

Notes:

[a] The VMT data provided by SCAG for 2020 and 2035 account for some future planned highway and transit network improvements that are part of SCAG's 2035 RTP/SCS.

Table 2-4. Total On Road Transportation GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast [a,b]

Analysis Year	MT CO^2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	3,359,231	42%	-
2020 Adjusted Forecast	3,657,532	40%	9%
2035 Adjusted Forecast	4,208,180	40%	25%

Notes:
Transit emissions are not included in the heavy-duty vehicle estimate. Please refer to the Regional Inventory for a discussion of transit emissions.
See prior note about SCAG's 2035 RTP/SCS.

Off-Road Transportation and Activity

Off-road equipment includes vehicles that do not operate on County roadways. Direct emissions of CO_2, CH_4, and N_2O are generated by equipment fuel combustion. The major off-road emissions sources include industry, construction, lawn and garden maintenance, recreational, and agriculture equipment. Off-road transportation emissions are generally a function of non-retail and industrial employment and activity.

Table 2-5 summarizes off-road emissions for the entire unincorporated County by equipment type. Table 2-6 presents the sector-wide emissions estimates in 2010, 2020, and 2035. As shown in Table 2-6, off-road emissions accounted for approximately 0.3% of total unincorporated County 2010 inventory (24,480 MT CO_2e). Emissions are expected to increase by 9% between 2010 and 2020 and by 31% between 2010 and 2035. The majority of this growth is driven by construction activity.

Table 2-5. Unincorporated LA County Off-Road Emissions by Equipment Type (MT CO_2e)

Equipment	2010	2020	2035
Agricultural Equipment	94.67	103.68	124.07
Construction and Mining Equipment	21,029	23,031	27,561
Entertainment Equipment	10	11	13
Industrial Equipment	669	732	877
Lawn and Garden Equipment	1,963	2,137	2,549
Light Commercial Equipment	313	343	410
Railyard Operations	0.09	0.10	0.12
Recreational Equipment	37.84	41.19	49.12
Transport Refrigeration Units	362.98	397.53	475.71
Total	*24,480*	*26,797*	*32,058*

Table 2-6. Off-Road GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast

Analysis Year	MT CO_2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	24,480	0.3%	-
2035 Adjusted Forecast	26,797	0.3%	9%
2010 Inventory	32,058	0.3%	31%

Solid Waste

Waste-related emissions are primarily CH_4, which is released over time when waste decomposes in a landfill. Organic waste that is buried in landfills decomposes under anaerobic conditions to produce CH_4. Waste generated by the County will be either diverted (through recycling, composting, etc.) or transported to a landfill.

Although some landfills receiving waste generated by the unincorporated County may not be located within the County boundaries, the activities that produce waste do occur within County limits and these emissions were allocated to the County. From 1995 to 2010, unincorporated LA County deposited its waste in 20 waste facilities. All of these facilities are located inside the County; some are in incorporated cities and some are in the unincorporated County.

Table 2-7 presents the 2010 emission inventory and 2020 and 2035 adjusted forecast for solid waste for unincorporated County. As shown in Table 2-7, solid waste emissions represent approximately 7% of total unincorporated emissions in 2010 (535,148 MT CO_2e). CH_4 emissions are expected to decrease between 2010 and 2020. This trend is a result of improvements in methane capture rate (1% increase) and historic waste disposal trends. Emissions will continue to decrease between 2010 and 2035.

Table 2-7. Solid Waste GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast

Analysis Year	MT CO_2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	535,148	7%	-
2020 Adjusted Forecast	500,952	6%	-6%
2035 Adjusted Forecast	482,258	5%	-10%

Wastewater Treatment

The primary providers of wastewater management services for unincorporated LA County include the County Sanitation Districts, Department of Public Works (DPW), and municipal septic or wastewater systems. The treatment of industrial, residential, and commercial wastewater produced within the unincorporated County generates indirect and direct GHG emissions. Indirect emissions are a result of energy consumption at each wastewater treatment plant (WWTP) serving the County. However, since this energy consumption at WWTPs serving the County was not separately available from the utilities, it could not be disaggregated from the building energy sector (and therefore

associated emissions are included in the building energy sector). Direct emissions of CH_4 and N_2O are produced during waste processing (fugitive emissions). This sector only includes fugitive emissions.

Table 2-8 presents the 2010 emission inventory and 2020 and 2035 adjusted forecast for wastewater treatment for unincorporated County. As shown in Table 2-8, wastewater treatment emissions represent a minor component of the 2010 inventory for unincorporated LA County. Emissions are expected to increase steadily between 2010 and 2020 and 2010 and 2035. Despite this growth, wastewater treatment will represent less than 1% of total unincorporated County emissions.

Table 2-8. Wastewater Treatment GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast

Analysis Year	MT CO_2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	29,885	0.4%	-
2020 Adjusted Forecast	32,526	0.4%	9%
2035 Adjusted Forecast	38,793	0.4%	30%

Water Conveyance

Water conveyance emissions accounted for approximately 1.3% of total emissions in 2010. Water-related emissions originate from energy used to transport water to the County. Emissions from water were estimated for the energy associated with water transport from *outside* the unincorporated areas (such as regional pumps delivering water from the State Water Project). Electricity used to pump groundwater, treat and distribute water locally is captured within the building energy sector and in the water supply, treatment, and distribution sector discussed below.

Table 2-9 presents the 2010 emission inventory and 2020 and 2035 adjusted forecast for water consumption for unincorporated County. Countywide, water consumption emissions represent less than 2% of total emissions and are expected to increase between 2010 and 2020 and 2010 and 2035. This trend is a result of future water demand due to a growing population (or growing commercial activity).

Table 2-9. Water Treatment and Conveyance GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast

Analysis Year	MT CO^2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	96,189	1.2%	-
2020 Adjusted Forecast	97,788	1.1%	2%
2035 Adjusted Forecast	115,824	1.1%	20%

Agriculture

Sources of agriculture emissions include livestock production and crop management. Emissions of CH_4 and N_2O can result from livestock production through enteric fermentation and manure management (Intergovernmental Panel on Climate Change 2006). Emissions of N_2O can result from anthropogenic inputs of nitrogen into soil through fertilizers by way of a direct (directly from the soils to which the nitrogen is added/released) and indirect (following volatilization of ammonia and oxides of nitrogen from managed soils) pathway (Intergovernmental Panel on Climate Change 2006). Both direct and indirect emissions of N_2O were calculated. The three general sources of agricultural emissions evaluated in this inventory include livestock enteric fermentation, livestock manure management, and N_2O emissions from the application of fertilizer.

Table 2-10 presents the 2010 emission inventory and 2020 and 2035 adjusted forecast for agriculture. As shown in Table 2-10, agricultural activity is a small component of the total inventory, accounting for 0.4% of total emissions in 2010 (30,290 MT CO_2e). These emissions are primarily generated by dairy operations. Countywide, future emissions are expected to decrease slightly, relative to 2010. This trend is a result of reductions in cropping activity. Livestock activity was assumed to remain constant.

Table 2-10. Agriculture GHG Emissions for Unincorporated LA County: 2010 Inventory and 2020 and 2035 Adjusted Forecast

Analysis Year	MT CO_2e	% of Unincorporated County Inventory	Emissions Change
2010 Inventory	30,290	0.4%	-
2020 Adjusted Forecast	30,141	0.3%	-0.5%
2035 Adjusted Forecast	29,948	0.3%	-1%

Sectors Presented for Informational Purposes

Emissions were calculated for several additional sectors for informational purposes only. These estimates were not added to the emissions total from the sectors discussed above.

Water Supply, Treatment, and Distribution

This sector includes electricity used to pump groundwater (supply), treat water in water treatment plants (treatment) and pump water to the unincorporated County (distribution). This sector includes the energy associated with water usage *inside* the unincorporated County (such as local pumps distributing water within the County's boundaries). Most or all of this electricity is likely already included in the building energy sector under Commercial/Industrial Electricity. To avoid double-counting emissions in the inventory, a separate line item is presented for informational purposes.

The water treatment and conveyance emissions sector includes the following indirect emissions by activity: electricity consumption for water supply (primarily groundwater pumping, which largely occurs inside the County), water treatment (electricity use at water treatment plants, which are primarily located inside the County), and water distribution (local water pumps included inside the County).

Table 2-11 presents water supply, treatment, and distribution emissions sinks in 2010, 2020, and 2035. As shown in Table 2-11, emissions are expected to increase between 2010 and 2020, and between 2010 and 2035. Increases in water consumption as a result of population and employment growth underpin much of this trend. However, the assumed replacement of SONGS with 50% renewables and 50% natural gas power also contributes to the forecasted increase in electricity-related emissions.

Table 2-11. Water Supply, Treatment, and Distribution: 2010 Inventory and 2020 and 2035 Adjusted Forecast (MT CO_2e)

Analysis Year	Emissions	Emissions Change (from 2010)
2010 Inventory	40,406	-
2020 Adjusted Forecast	43,120	7%
2035 Adjusted Forecast	50,316	25%

Urban and Natural Forests

Unlike other sectors described above, urban and natural forests are emissions sinks since these areas actively sequester atmospheric CO_2. "Natural forests" refers to forests that are not developed, and can include conservation areas, state and national forests and privately-owned forest land. "Urban forests" refers to trees planted within developed areas, including residential trees, urban parks, median trees, etc. While other land covers also sequester carbon (such as scrubland and grassland), by comparison to forested areas the amount of sequestration is far less. Wetlands can sequester large amount of carbon on a per acre basis, but overall the county has relatively limited wetland areas.

This sector represents a "snapshot" of sequestration for the entire County at a given moment in time (i.e., 2010). This will represent the current state of sequestration in the County, and will provide a sequestration value of the current natural vegetation in the inventory year. The sequestration data represents an emissions sink. Natural forests are part of the natural carbon cycle, and it isn't appropriate to count them as an "offset" against anthropogenic emissions sources. Accordingly, natural lands are considered biogenic emissions sinks and as such, this sector is not part of the GHG inventory. Table 2-12 presents urban and natural forest emissions sinks in 2010, 2020, and 2035. As shown in Table 2-12, sequestered emissions are expected to decrease between 2010 and 2020 and 2010 and 2035. This trend is a result of reductions in natural forest cover sequestration over time due to development.

Table 2-12. Sequestered Carbon Dioxide from Unincorporated Urban and Natural Forests: 2010 Inventory and 2020 and 2035 Adjusted Forecast (MT CO_2e)

Jurisdiction	2010	2020	2035	Emissions Change (2010–2020)	Emissions Change (2010–2035)
Urban and Natural Forests (in County jurisdiction)	-48,312	-44,418	-34,998	-8%	-28%
National and State Forests[a]					
Angeles National Forest	894,666	894,666	894,666	0%	0%
Los Padres National Forest	1,714	1,714	1,714	0%	0%
Total Unincorporated County[b]	848,068	851,962	861,382	0%	2%

Note:

[a] The county does not have jurisdiction over federal land. Thus, no changes are expected for National Forest Land due to their fixed boundaries.

[b] Values may not sum due to rounding.

Chapter 3
Methodology

This section presents the overall methodology used to prepare the 2010 unincorporated County inventory and 2020 and 2035 adjusted emissions forecasts. This section discusses the inventory definitions, inventory protocols used, emissions factors, and analysis methods.

Quantification Protocols

Numerous widely accepted protocols for estimating GHG emissions were used to prepare the unincorporated County inventory. At the time of the development of this inventory, there was no consensus community-level inventory protocol in the Unites States, municipal-level and national-level protocols serve as interim guidance documents for preparing community-level (e.g. county-level) GHG inventories. The protocols used in the development of the inventory and adjusted forecasts include those following (listed in order of applicability for the inventory).

- **ICLEI U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions** (ICLEI–Local Governments for Sustainability USA 2012). This protocol establishes a number of requirements for reporting community GHG emissions. The protocol requires inclusion of five basic emissions generating activities: use of purchased electricity, use of fuel in stationary applications, use of on-road motor vehicles, water consumption, and solid waste disposal. The protocol also recommends (but does not require) inclusion of other emissions sectors over which a jurisdiction has control or substantial influence. This inventory includes all the five basic emissions generating activities, as well as additional emission sectors under the control of the County (such as wastewater treatment and agricultural activity).
- **AEP California Community-Wide Greenhouse Gas Baseline Inventory Protocol White Paper** (Association of Environmental Professionals 2011). The purpose of this white paper is to provide recommendations to jurisdictions (cities and counties) on what could be included within a community-wide GHG emissions inventory and methodology for determining the geographic/jurisdictional boundary
- **CARB LGOP** (California Air Resources Board et al. 2010). This protocol is the standard for estimating emissions resulting from government buildings and facilities, government fleet vehicles, wastewater treatment and potable water treatment facilities, landfill and composting facilities, and other operations.[11]
- **Climate Registry General Reporting Protocol** (The Climate Registry 2009). This protocol provides guidance for preparing GHG inventories in California.

[11] The National Association of Clean Water Agencies have commented on the LGOP and noted that uncertainty exists with respect to the calculation procedures. In several cases, significant conservatism is assumed in the LGOP equations. The EPA has acknowledged this issue in its 2012 GHG inventory for the United States. Despite its potential conservatism, the LGOP is employed in this analysis as it is a recognized model for estimating community emissions from wastewater treatment. Moreover, the assumed conservatism of the LGOP yields a worst-case analysis of wastewater emissions.

- **IPCC Guidelines for National Greenhouse Gas Inventories** (Intergovernmental Panel on Climate Change 2006). This document is the international standard for inventories and provides much of the inventory methodology used in the national and statewide emissions inventories.
- **CARB California Greenhouse Gas Inventory Data 1990–2006** (California Air Resources Board 2010). CARB's documentation provides background methodology, activity data, protocols, and calculations used for California's statewide inventory.
- **CEC Inventory of California Greenhouse Gas Emissions and Sinks: 1990–2004** (California Energy Commission 2006). This inventory provides useful methodology and emission factors for statewide GHG emissions inventorying.
- **EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008** (U.S. Environmental Protection Agency 2011). This inventory provides useful methodology and emission factors for nationwide GHG emissions inventorying.

Emissions Sectors Included in the Analysis

As defined above, the unincorporated County inventory includes GHG emissions occurring within the boundaries of the unincorporated area. The following emissions sectors are included in the 2010 inventory and 2020 and 2035 adjusted emissions forecasts. The primary data source for each emission sector also is listed.

- **Building Energy:** natural gas and electricity consumption for the residential and commercial/industrial sectors. Data provided by utilities.
- **On-Road Transportation:** fuel consumption for light/medium-duty vehicles and heavy-duty trucks vehicles traveling in the unincorporated County. Data provided by SCAG (Leising pers. comm.).
- **Off-Road Transportation and Activity:** fuel consumption for off-road vehicles and equipment in the unincorporated County. Data provided by the OFFROAD model.
- **Stationary sources:** direct emissions from stationary combustion of fossil fuels of any type (except natural gas) and fugitive emissions from industrial processes. Data provided by SCAQMD, the Antelope Valley Air Quality Management District (AVAQMD), CARB, and EPA.
- **Solid Waste:** CH_4 emissions from waste generated by the unincorporated County and deposited in landfills. Data provided by the County of Los Angeles Department of Public Works Solid Waste Information Management System (SWIMS) and EPA's Landfill Methane Outreach Program (LMOP).
- **Wastewater Treatment:** fugitive emissions from domestic wastewater treatment. Data provided by LADWP, individual WWTP websites, County Sanitation District staff (Griffith pers. comm.), and the LGOP.
- **Water Conveyance:** electricity consumption associated with water supply, conveyance, treatment, and distribution. Data provided by the Urban Water Management Plans (UWMPs) for major water agencies in the County.
- **Agriculture:** enteric fermentation, manure management, and fertilizer application from livestock and farming operations. Data provided by the Los Angeles County Agricultural Commissioner and the National Agricultural Statistics Service.

In addition, the following sectors were quantified but included separately from the unincorporated County inventory and adjusted emissions forecasts:

- **Water Supply, Treatment, and Distribution:** electricity consumption associated with water supply, water treatment, and water distribution. Data provided by the Urban Water Management Plans (UWMPs) for major water agencies in the County. Electricity use for these activities, and therefore associated emissions, are likely included in the utility data for the County and contained in the building energy sector (water-related electricity use could not be disaggregated from utility data).
- **Urban and Natural Forests:** Emission sinks from urban and natural forests. Data provided by LA County, U.S. Forest Service (USFS), and U.S. Department of Agriculture.

Sources not quantified or included in the inventory are listed below along with the reason these sources are excluded from the County inventory.

- **Military:** fuel combustion and energy use at military bases in the County is not included as this activity is under federal control, not County control.
- **Marine ships:** fuel combustion on water-borne vessels is not included as these ships are involved in interstate and international commerce which is not under County control.
- **Aircraft:** fuel combustion in aircraft (taxiing and flying) is not included as aircraft are involved in interstate and international commerce which is not under County control.
- **Freight rail:** fuel combustion in freight rail locomotives is not includes as freight rail is involved in interstate commerce which is not under County control.
- **Public transit:** fuel combustion from busses and other public transit vehicles is not included due to the difficultly in a complex geography of the unincorporated County area for which it is difficult to accurately apportion transit emissions to the County. The County can influence transit emissions through interaction with transit agencies and its role in land use regulation, but it was not possible to assign these emissions to the County with any reasonable accuracy.
- **Non-local passenger rail:** fuel combustion in passenger trains that cross County boundaries is not included as the County does not control regional, state, and interstate passenger rail. In addition, there are methodological challenged to specifically assign passenger rail emissions to a single jurisdiction within a complex metropolitan area like the County.
- **Los Angeles World Airports (LAWA) activities:** gasoline, CNG LNG, and diesel fuel combustion from ground support equipment at LAWA airports is not included as these activities are under the authority of LAWA, which is an agency independent of the County.
- **Port Activities:** emissions from fuel combustion in ocean-going vessels, harbor craft, cargo handling equipment, rail locomotives, and heavy-duty vehicles operating on the terminals at the Port of Los Angeles and the Port of Long Beach is not included as the ports are under separate authority and are not controlled by the County.
- **Ozone Depleting Substances (ODS) and other high GWP gases:** fugitive emissions from ODS and high GWP gases (refrigerants, foams, etc.) are not included because data is not available on the specific use of these substances within the County area itself. Assignment of emissions using State or national per-capita average use was not considered sufficiently accurate to reflect actual local use within the County.

2020 and 2035 Adjusted Forecast

An adjusted emissions projection was developed for the years 2020 and 2035. These projections are a prediction of how community emissions may change by 2020 and 2035, without implementation of future reduction efforts for the *majority* of sectors. The transportation sector is an exception. The emissions forecasts account for some future planned highway and transit network improvements outlined in SCAG's 2012 RTP/ SCS (see Chapter 3 below for additional detail). The method used to forecast electricity-related emissions also differs from other sectors; emissions were forecasted to 2020 and 2035 assuming power generated by SONGS would be replaced by power from 50% renewables and 50% natural gas sources.

Table 3-1 summarizes the general methods for the emissions forecasts for each inventory sector listed above. Emissions were forecasted based on anticipated growth in population, housing, and employment (Table 1-1).

Table 3-1. Unincorporated County Inventory 2020 and 2035 Forecast Methodology

Sector	Forecasting Data	Data Sources
Included Emissions		
Building Energy	Residential Growth in housing with the SONGS adjusted SCE emission factor	SCAG
	Commercial/Industrial Growth in employment with the SONGS adjusted SCE emission factor	SCAG
On-Road Transportation	VMT projections from SCAG multiplied by emission factors forecasted for future years (EMFAC 2011)	SCAG CARB's EMFAC2011
Off-Road Transportation and Activity	Growth in population and employment applied OFFROAD2007 model output for 2020	SCAG CARB's OFFROAD2007
Stationary sources	Growth in employment applied to 2010 total emissions	SCAG
Solid Waste	Growth in population multiplied by per capita solid waste emissions	SCAG LA County's SWIMS
Water Conveyance	Future water withdrawal and demand projections	SCAG The Regional Water Demand Scenarios for Northeastern Illinois: 2005–2050 report
Wastewater Treatment	Urban Water Management Plan forecasts of per-capita water use rates and growth in population	SCAG UWMPs
Agriculture	Fertilize Application 1.20% annual reduction in cultivated land. Livestock 2010 emissions assumed to remain constant. This assumption likely overestimates future livestock emissions.	LA County
Emissions for Informational Purposes		
Water Supply, Treatment, and Distribution	Future water withdrawal and demand projections based on growth in population with the SONGS adjusted SCE emission factor	SCAG The Regional Water Demand Scenarios for Northeastern Illinois: 2005–2050 report
Urban and Natural Forests	LA County projections on change in unincorporated forest acreages for 2020 and 2035.	LA County

The methodology and assumptions for the adjusted projections are intended to produce a reasonable estimate of emissions for 2020 and 2035. Although the assumptions are supported by established inventory protocols and widely used inventory methodologies, the methodology for estimating the 2020 and 2035 adjusted forecast emissions for the County is subject to certain limitations. Specifically, in cases where future emission factor data are limited, the emission factors were assumed to remain constant from the current year's inventory. In addition, emissions were estimated based on historical and projected trends in associated emissions-generating activities. However, it is possible that future emissions may not actually follow these trends.

Emission Factors

Emission factors and references are summarized in Table 3-2. These emission factors were used to calculate GHG emissions from activity data, such as kilowatt-hour (kWh) of electricity consumed for lighting or gallons of gasoline fuel combusted for on-road transportation.

Table 3-2. Greenhouse Gas Emission Factors

Source	Emission Factor	Reference
Energy and Stationary Fuels		
Electricity		
EPA WECC/CAMX (eGRID)	610.82 lbs CO_2/MWh	EPA 2014 (2010 data)
	28.49 lbs CH_4/GWh	EPA 2014 (2010 data)
	6.03 lbs N_2O/GWh	EPA 2014 (2010 data)
Southern California Edison (2010)	610 lbs CO_2e/MWh	Birenbaum pers. comm.
SONGS Adjusted Southern California Edison	692 lbs CO_2e/MWh	-[a]
Natural Gas—General	53.02 kg CO_2/MMBTU	CR 2012
Natural Gas—Industrial	0.001 kg CH_4/MMBTU	CR 2012
	0.0001 kg N_2O/MMBTU	CR 2012
Natural Gas—Residential and Commercial	5 kg CH_4/MMBTU	CR 2012
	0.1 kg N_2O /MMBTU	CR 2012
LPG, Propane, Butane (average)	5.99 kg CO_2/gallon	CR 2012
	0.284 g CH_4/gallon	CR 2012
	0.057 g N_2O /gallon	CR 2012
Distillate Fuel Oil (average)	10.45 kg CO_2/gallon	CR 2012
	0.423 g CH_4/gallon	CR 2012
	0.085 g N_2O /gallon	CR 2012
Vehicle Fuels		
Diesel	10.21 kg CO_2/US Gallon	CR 2012
	0.0051 g CH_4/mile	CR 2012
	0.0048 g N_2O/mile	CR 2012
Gasoline	8.78 kg CO_2/US Gallon	CR 2012
	0.0327 g CH_4/mile	CR 2012
	0.0169 g N_2O/mile	CR 2012
Propane	5.79 kg CO_2/US Gallon	CR 2012

Source	Emission Factor	Reference
	0.066 g CH_4/mile	CR 2012
	0.175 g N_2O/mile	CR 2012
CNG	6.84 kg CO_2/GGE	CR 2012
	0.054 kg CO_2/scf	CR 2012
	1.966 g CH_4/mile	CR 2012
	0.175 g N_2O/mile	CR 2012
Vehicle Travel		
Light/Medium-Duty Vehicles	137.61 kg CO_2/mile	CARB 2011
	7.50 g CH_4/mile	CARB 2011
	7.51 g N_2O/mile	CARB 2011
Heavy-Duty Trucks	288.01 kg CO_2/mile	CARB 2011
	13.54 g CH_4/mile	CARB 2011
	9.70 g N_2O/mile	CARB 2011
Agriculture—Enteric Fermentation		
Dairy Cows	110 kg CH_4/animal/year	CARB 2009
Beef Cows	53 kg CH_4/animal/year	CARB 2009
Sheep	8 kg CH_4/animal/year	CARB 2009
Hogs and Pigs	1.5 kg CH_4/animal/year	CARB 2009
Goats	5 kg CH_4/animal/year	CARB 2009
Agriculture—Manure Management		CARB 2011
Dairy Cows	166.05 kg CH_4/animal/year	CARB 2011
	0.23 kg N_2O /animal/year	CARB 2011
Beef Cows	2.65 kg CH_4/animal/year	CARB 2011
	1.46 kg N_2O/animal/year	CARB 2011
Sheep	0.78 kg CH_4/animal/year	CARB 2011
	0.01 kg N_2O/animal/year	CARB 2011
Hogs and Pigs	26.12 kg CH_4/animal/year	CARB 2011
	0.02 kg N_2O/animal/year	CARB 2011
Chickens	0.17 kg CH_4/animal/year	CARB 2011
	0.001 kg N_2O/animal/year	CARB 2011
Turkeys and Squab	0.09 kg CH_4/animal/year	CARB 2011
	0.003 kg N_2O/animal/year	CARB 2011
Goats	0.37 kg CH_4/animal/year	CARB 2011
	0.00 kg N_2O/animal/year	CARB 2011
Agriculture—Fertilizer Application		
Fertilizer Application (average)	90 lbs/acre	EPA 1999
Direct N_2O (weighted average)	0.06 kg N_2O/acre/year	CARB 2011
Indirect N_2O (weighted average)	0.01 kg N_2O/acre/year	CARB 2011
Water-Related Electricity Intensities for Southern California		
Water—Supply—Groundwater	4.45 kWh/MG-foot	CEC 2006
Water—Supply—Desalination	13,800 kWh/MG	CEC 2006
Water—Conveyance—SWP	8,325 kWh/MG	CEC 2006

Source	Emission Factor	Reference
Water—Conveyance—LA Aqueduct	8,325 kWh/MG	CEC 2006
Water—Conveyance—Colorado River	6,140 kWh/MG	CEC 2006
Water—Conveyance—Recycled	0 kWh/MG	CEC 2006
Water—Conveyance—Local Surface	120 kWh/MG	CEC 2006
Water Treatment	100 kWh/MG	CEC 2006
Water Distribution—Recycled	2,100 kWh/MG	CAPCOA 2010
Water Distribution—Other	1,200 kWh/MG	CEC 2006
Wastewater Treatment	1,911 kWh/MG	CEC 2006

CAPCOA = California Air Pollution Control Officers Association
CARB = California Air Resources Board.
CEC = California Energy Commission
CNG = compressed natural gas.
CO_2 = carbon dioxide.
CH_4 = methane.
N_2O = nitrous oxide.
CR = The Climate Registry.
EPA = U.S. Environmental Protection Agency.
GGE = gasoline gallon equivalent
IPCC = Intergovernmental Panel on Climate Control
kg = kilogram.
kWh/MG = kilowatt hour per million gallons.
MG = million gallons.
MMBtu = million British thermal units
mmscf = million standard cubic feet
scf = standard cubic foot

[a] Calculated based on the following equation: (SCE 2010 Factor * (Natural Gas Factor * 19% * 50%)), where the SCE 2010 Factor is 610 lbs CO_2e/MWh, the Natural Gas Factor is 899 lbs/MWh, 19% represents the percentage of electricity supplied by SONGS in 2010, and 50% represents the assumed natural gas replacement (the other 50% of SONGS power is assumed to be replaced by renewable resources, which have a carbon intensity of zero).

Chapter 4
Recommendations for Future Inventories

This section provides an overview of any limitations that were encountered during the analysis. Limitations may occur when data are not available or when data are not appropriate for the methodology used.

The 2010 inventory identifies GHG emissions from unincorporated activities in LA County, and serves as a foundation for climate action planning. Future updates to the unincorporated County inventory presented in this report should be conducted every few years to ensure that the inventory remains accurate and that data gaps are resolved in a timely manner. This also would enable efficient tracking of the effectiveness of any GHG reduction measures implemented by the County.

General recommendations for updates to future inventories are presented below, followed by recommendations for each emission sector.

Quality and Availability of Activity Data

Although considerable efforts were made to obtain activity data,[12] in some cases these data were unavailable and the data had to be extrapolated using socioeconomic data. In addition, data obtained for certain sectors were provided in an aggregated format. For example, building energy use data provided by the major utilities supplying electricity and natural gas to the unincorporated County were aggregated by general sector (i.e., residential or commercial plus industrial) instead of by specific activity or entity. A greater level of detail and disaggregation would strengthen this inventory and greatly increase the potential for the County to identify, quantify, and monitor effective emission reduction actions. Specific data gaps and limitations are identified and discussed on a sector-by-sector basis below.

As described in the Executive Summary, electricity-related emissions were forecasted assuming power generated by SONGS in the inventory year (2010) would be replaced by power generated by 50% renewable and 50% natural gas sources. This assumption is based on the CPUC's final decision (Rulemaking 12-03-014) regarding the long-term procurement for local capacity requirements due to the permanent retirement of SONGS.

Exclusion of the Coastal Islands Planning Area

Data for the Coastal Islands Planning Area is extremely limited. Natural gas consumption and VMT for on-road transportation was not available for individual planning areas. These emission sources constitute approximately 54% of the 2010 inventory for unincorporated LA County, representing a significant data gap. Future inventory efforts should include more robust data collection for energy use and vehicle activity in the Coastal Islands Planning Area. Natural gas data may be available from SCE in the future, and VMT could possibly be estimated using traffic counts or future SCAG modeling.

[12] Such as total water use, building energy, transportation fuel use, stationary source emissions, and other forms of human activity.

A more complete inventory for the Coastal Islands Planning Area would improve the unincorporated County inventory and help the Coastal Islands Planning Area in future climate action planning efforts.

Limitations and Recommendations for Included Emissions Sectors

Building Energy Use

Inventory Limitations

- Nonresidential energy use was not available in additional, disaggregated categories (e.g., commercial, industrial, municipal).
- Water-related energy (i.e., energy used for pumping and water delivery) could not be disaggregated from the total electricity consumption provided by the utilities. As such, there may be some overlap and double-counting of emissions between the water treatment and conveyance sector and the building energy sector for water supply pumping, distribution, and treatment, since the utility data likely includes some of this electricity.

Forecast Limitations

- Power generated by SONGS in the inventory year (2010) is assumed to be replaced by power generated by 50% renewable and 50% natural gas sources. Electricity from all other sources (e.g., renewables, coal, hydro) and energy efficiency rates are held constant in future years.
- Energy-related emissions are directly proportional to population and employment for future years. It is likely that with future improvements in energy efficiency and consumer education, energy consumption will grow slightly slower than actual population or employment growth.
- Natural gas emission factors are held constant in future years.

Recommendations

- Collect utility data for more specific customer classes, perhaps by North American Industry Classification System (NAICS) code, to obtain electricity use for commercial and industrial activities separately.
- Collect utility data for electricity by planning area.
- Collect nonresidential natural gas consumption data for each planning area individually, instead of for the entire County as a whole.
- Update the 2020 and 2035 forecasts to represent future conditions as newer SCE emission factors become available.
- Request water-related electricity use data for the County from the utilities, to get a better picture of how the water sector contributes to electricity use.

On-Road Transportation

Inventory Limitations

- VMT data were not available from SCAG. Instead 2010 VMT were estimated using a linear interpolation from 2008 and 2012 VMT. SCAG recommended this approach to estimate 2010 VMT.
- VMT data were not available for the Coastal Island Planning Area. Therefore, the unincorporated area inventory for 2010 excludes emissions in the Coastal Islands. These are expected to be a very small portion of the total emissions.
- VMT associated with transit vehicles (e.g., LA Metro) were not included in the unincorporated County inventory because they were calculated on a county/regional level and could not be allocated to incorporated/unincorporated areas.

Forecast Limitations

- Because VMT data were not available for Coastal Island Planning Area, the adjusted forecasts for 2020 and 2035 exclude emissions in the Coastal Islands. These are expected to be a very small portion of the total emissions.
- The VMT data provided by SCAG for 2020 and 2035 account for some future planned highway and transit network improvements outlined in SCAG's 2035 RTP/SCS. As these assumptions are integrated into the data, the VMT underestimates the adjusted VMT and associated emissions.

Recommendations

- Develop an off-model method (e.g., targeted surveys, local level models) to quantify VMT in the Coastal Islands and obtain an estimate of GHG emissions occurring in those areas.
- Develop VMT and emissions estimates for transit emissions.

Off-Road Transportation and Activity

Inventory Limitations

- Off-road emission sources not included in the OFFROAD model, such as airport ground support equipment (GSE) at private airports and equipment at railyards, were not included in the inventory.
- Heavy and light rail (including commuter rail) emissions only available on a county-level and were not included in the unincorporated inventory.
- The OFFROAD model's default assumption of hours of operation for all equipment per year in the County was used to generate emissions.
- AMTRAK (intercity) rail was not included, since it traverses the boundaries of the County. Data for disaggregating AMTRAK emissions to the County were not available.
- Freight rail emissions were not included, since these trains traverse the boundaries of the County. Data for disaggregating freight rail emissions to the County were not available.

Forecast Limitations

- The OFFROAD model's emissions forecasts are less accurate for years further into the future; for example, the forecasts for 2020 are likely more accurate than the forecasts for 2035. This occurs because since the possibility for unforeseen changes in off-road activity and technology increases as the time gap increases.
- The OFFROAD2007 model is currently being replaced by the OFFROAD 2011 model. Accordingly, OFFROAD2007 may have less accurate forecasts than the current version of the model.

Recommendations

- Collect activity or emissions data for off-road equipment activity in each planning area.
- Include additional off-road sources in the inventory, such as airport GSE at private airports and equipment at railyards. GSE emissions could possibly be obtained from the airports themselves; railyard emissions could possibly be obtained through the CARB's *Railyard Health Risk Assessments and Mitigation Measures* webpage.[13]
- Include activity or emissions data for rail for each planning area in the County. Passenger miles for commuter rail services in each planning area could be calculated based on route miles and service schedules for each planning area, which could be used to determine emissions for each planning area.
- Utilize the OFFROAD2011 model, once publically available, to estimate emissions.

Agriculture

Inventory Limitations

- The amount of fertilizer applied per acre by crop type was taken from EPA estimates (U.S. Environmental Protection Agency 1999).
- Livestock related emissions (enteric fermentation and manure management) were calculated based on livestock categories provided by the LA County Agricultural Commissioner and the National Agricultural Statistics Survey and corresponding emission factors (Vittayavongvanich pers. comm.). Livestock emission factors from CARB are available by livestock category and also by subcategory within each category of animal (California Air Resources Board 2011). For each livestock category, subcategories with more precise emission factors are available. For example, CARB has emission factors for market swine under 60 pounds, market swine between 120 and 179 pounds, etc. Livestock data in the County were available only by broad category—swine, chickens, etc. The accuracy of the emissions calculations may be limited because of this discrepancy between the available emission factors and the data available. Due to the limited amount of livestock in the County, however, this data gap is most likely minor.

Forecast Limitations

- Crop land forecasts are based on the County's assumption of countywide 1.2% annual reduction in agricultural lands. This assumption is based on aggregated trending data that the County has

[13] See: http://www.arb.ca.gov/railyard/hra/hra.htm

reviewed and various sources from the Planning Department. These take into account changes in agricultural lands occur as private ownership of agricultural lands and local zoning policies change. While zoning policies are under the jurisdiction of local governments, and thereby knowable, changes in private ownership and usage of agricultural lands are dependent on the less predictable balance between the economic demands for crops and the land on which the crops are produced due to urbanization or development.

- Agricultural forecasts were assumed to equal emissions in 2010.

Recommendations

- Collect fertilizer application rates specific to the County, if available.
- Collect livestock data at the same level of aggregation as CARB's emission factors in order to calculate emissions with a greater level of accuracy.

Solid Waste

Inventory Limitations

- Historic waste disposal data before 1995 (pertinent to some landfill opening years) was not available. Per capita waste disposal rates were estimated based on historical population information to estimate waste deposited before 1995.
- For modeling purposes to estimate waste disposal by landfill for years before current landfills were open, it was assumed that waste goes to an unknown landfill which represents the average characteristics of other landfills used by the unincorporated County.
- Landfill profile data was not available for some landfills; in these cases, default values from CARB's first order of decay (FOD) model were used.
- Actual CH_4 capture rates for most landfills with methane capture systems were not known. The default value of 75% was used for these landfills.
- Emissions from waste imported into LA County Landfills from jurisdictions outside of LA County are not included in the inventory.

Forecast Limitations

- Forecasted emissions are based on 2010 per-capita waste disposal rates and population projections for unincorporated County. This assumes that the per-capita waste disposal rate does not change over time.
- Nonresidential waste disposal was not projected separately. Waste disposal was compared to the total population area to obtain per-capita waste disposal rates. These rates were then used to forecast waste emissions.
- The latest diversion rate available for the unincorporated County is for the year 2006. This diversion rate (54%) was assumed to remain constant for all future years. Changes to the diversion rate will be incorporated into the forthcoming community climate action plan.
- Landfill characteristics were assumed to remain constant in the future. For example, it was assumed that all landfills with methane capture systems would continue to capture CH_4 at the

same rate for all future years, and landfills without methane capture would not install capture systems in the future. This is consistent with a BAU approach to forecasting waste emissions.

- Population was assumed to grow linearly from 2010 to 2020 and from 2020 to 2035. Interim year population data was needed to estimate waste emissions using the FOD model, which requires waste disposal tonnages for each year.

Recommendations

- Site-specific landfill CH_4 capture rates would improve this sector of the inventory. Although individual landfill operators may collect data onsite related to the maintenance and operation of gas flaring systems, these data are not always sufficient to estimate precise CH_4 destruction efficiency. Contact individual landfill operators to obtain actual methane capture monitoring and capture data for each landfill serving the planning areas (or at least the major landfills).
- Landfill site-based emissions (i.e., direct emissions from a specific landfill regardless of where the waste originated) or "waste-in-place" emissions for the largest landfills (landfills with greater than 10,000,000 tons of waste in place)[14] located in each planning area could be included in the unincorporated County inventory. Site-based analysis would not replace the generation-based estimates of solid waste emissions described above; it would be a supplement to those emissions.
- Continue to track waste disposal tonnages and destination landfill by planning area into the future. This will allow for more accurate inventory updates and forecasts of waste emissions in the future.

Wastewater Treatment

Inventory Limitations

- The energy consumed to operate any WWTP that is located within County borders was included in the building energy sector as it is typically contained in the utility data (nonresidential data). The utility data was not detailed enough to allow for the disaggregation of this energy for the County.
- Actual emissions data from the following WWTPs were used in the 2010 inventory: the Malibu Mesa Water Reclamation Plant, the Malibu Water Pollution Control Plant, the Trancas Water Pollution Control Plant, and the Lake Hughes Community Wastewater Treatment Facility. Specific data for additional WWTPs in the unincorporated County were not available. Consequently, the emissions data for the four WWTPs listed above were used to approximate fugitive wastewater treatment emissions for the remainder of the WWTPs serving the unincorporated County.
- Fugitive emissions are based on WWTP proxies and population data.
- This sector only includes fugitive emissions from wastewater treatment processes. It does not include emissions from electricity and natural gas consumed by the WWTPs in the County. These emissions are included in the building energy sector, since wastewater-specific energy use was not available from the utilities.

[14] Due to the large number of landfills (according to CALRecycle, there are 280 disposal facilities in the county, including 19 landfills and 225 disposal sites), calculating site-based emissions for each landfill is infeasible.

Forecast Limitations

- The energy required to treat wastewater remains constant in all future years.
- The treatment processes which emit fugitive GHG emissions remain constant in all future years.
- Emissions were assumed to be proportional to population for all future years (i.e., the 2010 wastewater emission rate per-capita was used to estimate emissions for 2020 using the 2020 population).

Recommendations

- Collect actual energy use data (e.g., electricity and natural gas use) from each WWTP serving the planning areas in the County, if available, in order to estimate emissions for energy use. This data may be available through the utilities, although it may be protected through confidentiality agreements.
- Coordination with the LA County Sanitation District to obtain WWTP-specific activity, energy use, and/or emissions data would improve the accuracy of the wastewater treatment emissions estimates.
- Collect WWTP electricity and natural gas consumption data in order to estimate emissions for energy use. Care must be taken to avoid double-counting these emissions with the building energy sector.
- Calculate emissions for individual WWTPs using actual WWTP characteristics such as population served, cubic feet of digester gas produced per day, fraction of methane in digester gas, BOD5 load (biochemical oxygen demand of wastewater during decomposition occurring over a 5-day period), and the fraction of BOD5 removed during treatment.

Water Conveyance

Inventory Limitations

- Regional water energy intensities were used to calculate electricity and associated emissions from water treatment and conveyance. Although these intensities are fairly accurate for imported water, they may be less accurate for local water (e.g., groundwater supply, water treatment).

Forecast Limitations

- The energy required to convey water remains constant in all future years.
- Statewide electricity emission factors are held constant in future years.

Recommendations

- Local water energy intensities may be developed based on UWMPs and information from the Municipal Water Districts serving the planning areas. Local intensities may be more accurate than the regional intensities used in the 2010 inventory.

Stationary Sources

Inventory Limitations

- SCAQMD fuel use data was not provided on a facility basis which would have allowed more accurate apportioning of emissions to the County.
- Natural gas consumption for large industrial facilities was included in this sector in order to maintain a total emissions line-item which is subject to State Cap and Trade Regulation. If natural gas emissions were removed, then total emissions subject to Cap and Trade would not be present in the inventory. However, some of this natural gas use is included in the utility data, and some emissions are therefore already included in the building energy sector. The building energy sector does not account for 100% of large industrial facility natural gas use, as some of the facilities are supplied directly by markers not overseen or tracked by SoCal Gas.

Forecast Limitations

- Stationary source emissions forecasts use growth factors proportional to the employment growth from the socioeconomic forecasts provided by Iteris (Olson pers. comm. 2012). Only employment growth in agriculture, construction, manufacturing, and transportation were considered. Any stationary source emissions resulting from other employment sectors would not be captured in this forecast.
- Using the employment growth factors assumes that the ratio of stationary source emissions to employee stays constant. Changes in technology that would improve efficiency of mechanisms that emit stationary sources would decrease this ratio. Likewise, changes in the economy could result in greater number of employees increase this ratio.
- Stationary source fuel emission factors are held constant in all future years.

Recommendations

- Collecting stationary source emissions and fuel use data on a facility-basis would allow for a more complete inventory. However, due to privacy concerns, it may be politically and economically unfeasible to obtain this data from smaller entities. Despite this limitation, we recommend greater participation with SCAQMD and AVAQMD to develop more detailed inventories for the County.

Limitations and Recommendations for Emissions Sectors Included for Informational Purposes

Water Supply, Treatment, and Distribution

Inventory Limitations

- Water-related energy (i.e., energy used for pumping and water delivery) could not be disaggregated from the countywide total electricity consumption provided by the utilities. As such, there may be some overlap and double-counting of emissions between the water treatment and conveyance sector and the building energy sector for water supply, treatment, and distribution, since the utility data likely includes some of this electricity.

- Regional water energy intensities were used to calculate electricity and associated emissions from water treatment and conveyance. Although these intensities are fairly accurate for imported water, they may be less accurate for local water (groundwater supply, water treatment, etc.).

Forecast Limitations

- The energy required to treat and distribute water remains constant in all future years.
- The electricity emission factor for SCE was adjusted to assume power generated by SONGS in the inventory year (2010) would be replaced by power generated by 50% renewables and 50% natural gas sources. Electricity from all other sources (e.g., renewables, coal, hydro) and energy efficiency rates are held constant in future years.

Recommendations

- Request water-related electricity use data for the county from the utilities, to get a better picture of how the water sector contributes to electricity use in the County.
- Local water energy intensities may be developed based on UWMPs and information from the Municipal Water Districts serving the cities. Local intensities may be more accurate than the regional intensities used in the Regional Inventory.
- Update the 2020 and 2035 electricity emissions to represent future conditions as newer SCE emission factors become available.

Urban and Natural Forests

Inventory Limitations

- While a rich and valuable data set was already available through the LA Tree Canopy Cover geographic information system (GIS) layer and the NASS CropScape, these data sets only provide acreages and not numbers of trees in the area. The number of trees was estimated using an average canopy-to-tree ratio.
- Non-urban forest land areas in the unincorporated area were approximated using acreages from NASS for three forest types: deciduous, evergreen, and mixed. The carbon sequestration rates, however, represented a smaller, more specific, set of typical forest species provided by CEC. Applying the CEC carbon sequestration rates to the broader NASS forest categories may result in some minor misrepresentation of the actual carbon sequestration impacts of the unincorporated non-urban forests. Because both datasets aim to represent the aggregated South Coast forest area, this data gap is most likely minor.

Forecast Limitations

- Future changes in urban and natural forest coverage are based on the County's assumptions as to the expected change in privately owned forest areas. Calculations assume an 8% reduction in private forest land by 2020 and 24% by 2035. Limitations behind these percent reduction assumptions also apply to the subsequent sequestration calculations. Public forest land is assumed to remain unchanged in the forecast years.

Recommendations

- Although the method used is the most accurate approach given the available data, a more accurate method of developing a representative tree inventory would be to do an annual detailed tree survey. Due to the highly labor intensive nature of this approach, we recommend employing the arboreal expertise of USFS and local forest stakeholders to develop representative tree species profiles of the LA County areas and apply them to up-to-date GIS imagery of the urban and natural forests.

Chapter 5
References

Association of Environmental Professionals (AEP). 2011. *California Community-Wide Greenhouse Gas Baseline Inventory Protocol White Paper.* Available: <http://www.califaep.org/docs/WhitePaper_June2011.pdf>. Accessed: May 29, 2012.

Blasing, T. J. 2013. *Recent Greenhouse Gas Concentrations*. DOI: 10.3334/CDIAC/atg.032. Updated February.

California Air Pollution Control Officers Association (CAPCOA). 2010. *Quantifying Greenhouse Gas Mitigation Measures*. Available: <http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf>. Accessed: May 31, 2012.

California Air Resources Board. 2011. California's 2000-2009 Greenhouse Gas Emissions Inventory Technical Support Document. December.

California Air Resources Board, California Climate Action Registry, Local Governments for Sustainability, and the Climate Registry. 2010. *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories*. Version 1.1. May 2010. Los Angeles, CA.

California Air Resources Board. 2008. *Climate Change Scoping Plan.* Available: <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>. Accessed: June 16, 2012.

California Air Resources Board. 2009. *California's 1990-2004 Greenhouse Gas Emissions Inventory and 1990 Emissions Level – Technical Support Document.* Available: <http://www.arb.ca.gov/cc/inventory/doc/methods_v1/ghg_inventory_technical_support_document.pdf>. Accessed: March 15, 2012.

California Air Resources Board. 2011. *EMFAC2011*. Computer program, 2011. Available: http://www.arb.ca.gov/msei/msei.htm Accessed: June 8, 2012.

California Air Resources Board. 2013. *California Greenhouse Gas Inventory for 1990-2010—by Category as Defined in the Scoping Plan*. Last Revised: August 2013. Available: <http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-10_2013-02-19.pdf>. Accessed: November 5, 2013.

California Climate Action Registry. 2009. General Reporting Protocol. Version 3.1. January.

California Energy Commission. 2006. *Inventory of California Greenhouse Gas Emissions and Sinks 1990 to 2004. (CEC-600-2006-013-SF.)* December. Last revised: December 2006. Available: <http://www.energy.ca.gov/2006publications/CEC-600-2006-013/CEC-600-2006-013-SF.PDF> Accessed: January 21, 2011.

ICLEI–Local Governments for Sustainability USA. 2012. *U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*. October. Available: <http://www.icleiusa.org/tools/ghg-

protocol/community-protocol/us-community-protocol-for-accounting-and-reporting-of-greenhouse-gas-emissions >. Accessed: April 8, 2013.

Intergovernmental Panel on Climate Change. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html>. Accessed: August 17, 2010.

Intergovernmental Panel on Climate Change. 2007a. *Introduction*. In B. Metz, O. R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer, (eds.), *Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007.* Cambridge, U.K. and New York, NY, USA: Cambridge University Press. Available: <http://www.ipcc.ch/pdf/assessment-report/ar4/wg3/ar4-wg3-chapter1.pdf>. Accessed: August 11, 2009.

Intergovernmental Panel on Climate Change. 2007b. *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor and H.L. Miller (eds.). Available: <http://www.ipcc.ch/ipccreports/ar4-wg1.htm>. Accessed: September 22, 2009.

Los Angeles County. 2012. 2035 General Plan: Revised Draft May 2012 Text-Only Version. Available: <http://planning.lacounty.gov/generalplan/draft2012>. Accessed: July 10, 12.

National Oceanic and Atmospheric Administration. 2005. *Greenhouse Gases: Frequently Asked Questions*. Available: <http://lwf.ncdc.noaa.gov/oa/climate/gases.html>. Accessed: September 22, 2009.

National Oceanic and Atmospheric Administration. 2012. *Trends in Atmospheric Carbon Dioxide*. Earth System Research Laboratory, Global Monitoring Division. Last Updated: May 2012. Available: <http://www.esrl.noaa.gov/gmd/ccgg/trends/index.html#global>. Accessed June 15, 2012.

National Oceanic and Atmospheric Administration. 2013. *Trends in Atmospheric Carbon Dioxide*. August 2013. Available: <http://www.esrl.noaa.gov/gmd/ccgg/trends/global.html>. Accessed: November 5, 2013.

Southern California Association of Governments (SCAG). 2011. *Profile of the Unincorporated Area of Los Angeles County*. May 2011. Available: <http://www.scag.ca.gov/resources/pdfs/2011LP/UnIncLosAngelesCounty.pdf>. Accessed: May 31, 2012.

Southern California Association of Governments. 2012. *2012–2035 Regional Transportation Plan/Sustainable Communities Strategy*. Project List Appendix. Adopted April 2012.

Statewide Energy Efficiency Collaborative (SEEC). 2012*. SEEC Community Inventory Tool*. Available: <http://californiaseec.org/tools-guidance/seec-community-inventory-tool>. Accessed: March 20, 2012

The Climate Registry. 2009*. Utility Emission Factors 04-07*. Available: <www.climateregistry.org/resources/docs/PUP_Metrics-June-2009.xls>. Accessed: December 22, 2011.

Intergovernmental Panel on Climate Change. 1996. *1995: Science of Climate Change. (Second Assessment Report)*. Cambridge, U.K.: Cambridge University Press.

U.S. Environmental Protection Agency. 1999. *Background Report on Fertilizer Use, Contaminants, and Regulations.* Accessed February. Available: <http://www.epa.gov/oppt/pubs/fertilizer.pdf>. Accessed: March 15, 2012.

U.S. Environmental Protection Agency. 2006. *High Global Warming Potential (GWP) Gases*. Available: <http://www.epa.gov/highgwp/scientific.html>. Accessed: September 22, 2009.

U.S. Environmental Protection Agency. 2010. *Criteria Pollutant Information.* Last Revised: July 1, 2010. Available: <http://www.epa.gov/air/urbanair/>. Accessed: October 14, 2011.

U.S. Environmental Protection Agency. 2011. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2009*. EPA 430-R-11-005. April. Available: <http://epa.gov/climatechange/emissions/usinventoryreport.html>. Accessed: June 24, 2011.

U.S. Environmental Protection Agency. 2012. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2010. EPA 430-R-12-001. April.

U.S. Environmental Protection Agency. 2014. *eGRID*. Last Revised: February 24, 2014. Available: < http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html>. Accessed: March 2014.

Western Regional Climate Center (WRCC). 2009. *Climatological Summary*. Period of Record: Apr 1998 to Dec 2008. Available: http://www.wrcc.dri.edu/summary/smo.ca.html Accessed: June 1, 2012.

Personal Communications

Birenbaum, Evan. Sr. Program Manager. Environmental Strategy & Corporate Responsibility. Southern California Edison. October 28, 2013—email message with SCE 2010 emission factor.

Griffith, Patrick. Senior Engineer. L.A. County Sanitation District, Los Angeles, CA. April 3, 2013—Email message to Connie Chung (LA County) regarding LACSD comments on the CAP for LA County Unincorporated Areas.

Leising, Cheryl. Administrative Assistant. Southern California Association of Governments, Riverside, CA. September 4, 2013—email message to Rebecca Rosen, ICF International.

Olson, Rob. Senior Transportation Engineer. Iteris, Santa Ana, CA. February 28, 2012—Email with socioeconomic data for Los Angeles County.

Ryu, Sung Ho. Southern California Association of Governments, Riverside, CA. October 3, 2013—Email with socioeconomic data for Los Angeles County.

Vittayavongvanich, Kanit. Inspector. Los Angeles County Department of Agricultural Commissioner Pesticide Regulation Division Environmental Bureau, Arcadia, CA. July 12, 2012—Email with dairy cattle numbers for Los Angeles County.

Yoon, Sungsu. Southern California Association of Governments. September 24, 2013—email message to Rebecca Rosen, ICF International.

Appendix C
Actions to Reduce Greenhouse Gas Emissions

This appendix summarizes the local and State actions included in the County's Community Climate Action Plan (CCAP). Local actions are summarized by the five strategy areas discussed in Chapter 4. The following information is provided for all actions, where appropriate.

- **Action Goal:** Intent and any tangible metrics.
- **Lead (Supporting) Entity:** Lead and (supporting) entity responsible for implementation of the action. A specific *County* department has been identified as the lead responsible entity for the majority of CCAP actions. Note that additional entities, including other County departments or external agencies, may also be involved in the implementation of these actions. Lead responsibility for a few CCAP actions will be at the discretion of external agencies. The County anticipates supporting the lead entities for these actions, as needed, to identify targets and other metrics to support action implementation.
- **Action Status:** Identifies whether greenhouse gas (GHG) emissions benefits are currently counted toward attainment of the County's CCAP target. The majority of actions where the County will serve as the lead responsible entity have been quantitatively evaluated. For some actions, explicit goals have not been established and are therefore not quantified or counted toward attainment of the County's CCAP target. In many cases, these actions build on existing actions and may result in additional GHG reductions in the future. The County will identify goals for these actions and quantify GHG reductions as part of future CCAP updates. GHG reductions associated with actions where external agencies are the lead have not been quantified as the County does not have direct control over action implementation.
- **Additional Information:** Existing initiatives related to specific actions.
- **Approaches:** Measures that may be implemented to achieve the action's goals. These measures are not inclusive and may be supplemented by additional measures and/or subject to change during the implementation phase of the CCAP.

Green Building and Energy

BE-1. Green Building Development

Action Goal: Promote and incentivize at least Tier 1 voluntary standards within CALGREEN for all new residential and nonresidential buildings. Develop a heat island reduction plan and facilitate green building development by removing regulatory and procedural barriers.

Lead (Supporting) Entity: Los Angeles (LA) County Internal Services Department (LA County Department of Regional Planning).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

Additional Information: Title 31 of the Los Angeles County Code currently requires 15% less energy use than the 2005 State Energy Efficiency Standards (Title 24). Under this action, the County would promote new development to incorporate the Tier 1 voluntary standards within CALGREEN. Adoption of the Tier 1 standards is voluntary, but would result in approximately 15% less energy use than the 2013 Title 24 standard for residential development and 10% less energy use than the 2013 Title 24 standard for commercial development. Compliance with Title 31 of the Los Angeles County Code and applicable State-mandated Title 24 standards is independent of this action and mandatory for all new development. The heat island mitigation plan to be developed by the County will include guidelines for cool roofs, cool pavements, and strategically placed shade trees.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Provide grants and other incentives and/or leverage outside grants, funding, and incentives to support green building.
- Provide green building outreach, training, and education. The County will continue to provide green building information, marketing, training, and technical assistance to property owners, development professionals, schools, and special districts through its current and new grant programs.
- Continue to operate the County's Environmental Service Centers (ESC). The ESCs, located countywide, provide information, materials, and resources to constituents about a range of County-sponsored (and non-County sponsored) sustainability and environmental programs. There are several permanent ESCs staffed by trained County and contract personnel, as well as literature racks with resources for the public, and other resources.
- Continue to implement sustainable affordable multifamily housing through the Affordable Multifamily Rental Housing Program.

BE-2. Energy Efficiency Programs

Action Goal: Conduct energy efficiency retrofits for at least 25% of existing commercial buildings over 50,000 square feet and at least 5% of existing single-family residential buildings. Promote innovative, low-interest financing for energy efficiency projects for existing development. Create energy conservation campaigns and partner with utilities and other entities on energy efficiency.

Lead (Supporting) Entity: LA County Internal Services Department (LA County Department of Regional Planning).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

Additional Information: Retrofits will target lighting, heating and air conditioning units, and overall building energy use. The residential building retrofits will expand upon the Energy Upgrade California in Los Angeles County[1] and utilize a *whole home* approach, which typically reduces

[1] Currently few, if any, jurisdictions in the United States are achieving more than 2% penetration on home performance programs.

electricity consumption by 25–35%.[2] Likewise, the energy efficiency financing will expand on the Los Angeles Commercial Building Performance Partnership and will include financing for heating, ventilation, air conditioning, lighting, water heating equipment, insulation, and weatherization.

Approaches: The following strategies may be used to help achieve the action goals and support implementation.

Commercial Retrofit Strategies

- Expand savings of Southern California Edison's (SCE's) direct install program by 10%.[3]
- Promote individualized energy management services for large energy users.
- Partner with SCE to leverage the Savings by Design incentive program for commercial projects. Savings by Design incentive requires 10% better than Title 24 standards in order to qualify; up to $500,000 in performance rebates are available.
- Launch energy efficiency campaigns targeted at business (e.g., Chicago Green Office Challenge). Provide public education on the need for energy efficiency and emissions reduction programs and incentives.
- Utilize the energy efficiency ratings disclosed through Assembly Bill (AB) 1103 to target assistance programs on high use buildings based on energy use per square foot. Encourage building owners to upload their ratings to Portfolio Manager so they will be easily accessible to the general public.

Residential Retrofit Strategies

- Partner with SCE to implement and expand their residential rebate programs for energy efficiency upgrades.
- Implement a low-income weatherization program.
- Create a rental home inspection program as a vehicle to promote energy efficiency improvements in rental units. Require minimum levels of insulation, maximum levels of envelope and duct leakage, and other selected improvements at time of sale. Review existing County policies to identify potential barriers to green building techniques and determine appropriate updates and revisions as needed.
- Assign key staff members who understand the latest green technologies to serve as points of contact for energy efficiency improvement projects.
- Increase participation of SCE's multifamily energy efficiency program to 25% by 2020.[4]
- Continue to implement multifamily home retrofits through the Affordable Multifamily Rental Housing Program and Home Improvement Program. Consider modifications to the Home Ownership Program to incorporate energy retrofits.[5]

[2] This is a typical range for home performance programs currently. Given LA's climate more drastic reductions might not be feasible. San Francisco is achieving about 35% energy reduction per home with its home performance program.

[3] The direct install program helps buisnesses save money and reduce energy through free energy efficiency evaulations. SCE reported average savings of about 3% for the 2006–2008 program cycle.

[4] Participation rate as of 2008 was 12%, most recent year that data is available.

[5] The GHG calculations for this action include reductions for 560 public housing units, 180 affordable multifamily rental housing units, 999 Community Development Commission (CDC) affordable housing units, and 490 home improvement program units (assumes resources are available).

Energy Financing Strategies

- Increase funding to non-low-income homeowners who participate in Energy Upgrade California to cover 25% of the cost of a whole house retrofit.[6]
- Provide grants to low-income homeowners who participate in Energy Upgrade California to cover 100% of costs of a whole house retrofit.
- Expand the amount of Property Assessed Clean Energy (PACE) available in LA County. In PACE financing, money is made available to commercial property owners for energy efficiency improvements that can then be paid back via the property tax bill PACE may also be possible for residential applications using the approach being used by the Western Riverside Council of Governments (WRCOG) and the San Bernardino Associated Governments (SANBAG).
- Remove funding barriers for energy efficiency improvements. For example, leverage federal tax credits or local rebates, such as those offered by SCE. Provide innovative, low-interest financing for energy efficiency and alternative energy projects. Fund incentives to encourage the use of energy-efficient equipment and lighting. Provide financial incentives for adoption of identified efficiency actions.

Energy Coordination Strategies

- Develop a program to drive real estate professionals toward the Energy Upgrade California Certified Green Real Estate Professional program for training.[7]
- Expand on efforts to drive participation in the GreenPoint Rated labeling program.[8]
- Coordinate with local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop policies and programs that are optimized on a regional scale. The County will continue to adhere to the LA County Regional Collaborative (LARC) charter, demonstrating their commitment to regional climate action and sustainability.

BE-3. Solar Installations

Action Goal: Promote and incentivize solar installations for new and existing homes, commercial buildings, carports and parking areas, water heaters, and warehouses.

Lead (Supporting) Entity: LA County Department of Regional Planning (LA County Internal Services Department, LA County Department of Public Works).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

Additional Information: This action includes development of incentives to expand solar water heating.

[6] "Experience with a variety of energy efficiency programs suggests that the average public contribution to efficiency investments for homeowners who are not low-income needs to be at least 25% to achieve savings on the order of 20%–35%. For low income households, it will usually be necessary to pay for all of the up-front investment." Source: Neme, Gottstein, and Hamilton. 2011. Residential Efficiency Retrofits: A Roadmap for the Future.

[7] Energy Upgrade California's Certified Green Real Estate Professional course prepares real estate professionals to help customers buy and sell existing green homes.

[8] The GreenPoint Rated label provides a mark of quality for green home upgrades and is a system that awards points for energy-efficient homes as well as other green building attributes.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Develop a partnership with SCE and Los Angeles Department of Water and Power (LADWP) to explore possibilities for solar energy production for existing development.
- Promote innovative, low-interest financing for residential and commercial renewable energy, such as PACE financing.
- Adopt the Renewable Energy Ordinance that outlines development guidelines for solar installation.
- Continue to identify and remove regulatory or procedural barriers to producing renewable energy in building and development codes, design guidelines, and zoning ordinances.

BE-4. Alternative Renewable Energy Programs

Action Goal: Implement pilot projects for currently feasible wind, geothermal, and other forms of alternative renewable energy.[9]

Lead (Supporting) Entity: LA County Internal Services Department (LA County Department of Regional Planning, LA County Department of Public Works).

Action Status: GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by BE-4 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: This action complements *BE-3: Solar Installations* by supporting other forms of renewable energy (e.g., wind). Diversifying the County's electricity portfolio will improve the flexibility and resiliency of power delivery.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Collaborate with LADWP to develop an Alternative Energy Development Plan to identify the allowable and appropriate alternative energy facility types in the county.
- Adopt the Renewable Energy Ordinance to support new renewable energy technologies.

BE-5. Wastewater Treatment Plant Biogas

Action Goal: Encourage renewable biogas projects.

Lead (Supporting) Entity: All Operators of Wastewater Treatment Facilities.

Action Status: GHG emissions reductions have not been quantified or counted towards attainment of the County's CCAP target. Inclusion of GHG benefits achieved by BE-5 in future CCAP updates is

[9] Potential future forms of non-GHG energy could include nuclear fusion, which is being researched by many parties, including the Lockheed Martin Skunk Works in Palmdale, but which has not yet been experimentally proven as a viable commercial energy source. As new technologies become proven, the County will consider how they can support further development and deployment of such technologies.

contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: Various rules and regulations require wastewater treatment plant operators to capture the biogas generated from the treatment of wastewater. The captured methane is routinely used to offset non-renewable energy use by installing biogas to energy projects when economically feasible. The Sanitation Districts also operate a 35 megawatt biogas turbine combined cycle power generating facility at the Joint Water Pollution Control Plant. The system provides 95% of plant power needs, reducing GHG emissions and savings close to $20 million per year in electricity costs.

Approaches: The County should partner with the owners and operators of wastewater treatment plants to identify incentives to further encourage renewable biogas projects.

BE-6. Encourage Energy Efficiency Retrofits of Wastewater Equipment

Action Goal: Encourage the upgrade and replacement of wastewater treatment and pumping equipment.

Lead (Supporting) Entity: All Operators of Wastewater Treatment Facilities.

Action Status: GHG emissions reductions have not been quantified or counted towards attainment of the County's CCAP target. Inclusion of GHG benefits achieved by BE-6 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: Replacement of equipment slated for retirement with more energy-efficient equipment, as well as utilization of best management practices will reduce equipment energy consumption. Wastewater treatment facilities throughout the LA County region are actively engaged in pursuing energy efficiency projects at regional wastewater treatment facilities. Implementation of BE-6 will continue and potentially expand existing efforts, further reducing GHG emissions associated with wastewater processing and treatment.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Partner with facility operators to identify equipment slated for retirement.
- Develop a best management practices checklist for reducing equipment energy consumption.

BE-7. Landfill Biogas

Action Goal: Partner with the owners and operators of landfills with at least 250,000 tons of waste-in-place to identify incentives to capture and clean landfill gas to beneficially use the biogas to generate electricity, produce biofuels, or otherwise offset natural gas or other fossil fuels.

Lead (Supporting) Entity: All Operators of Landfill Facilities

Action Status: Implementation may be at the discretion of the landfill owners or other agencies, such as the Department of Regional Planning, which issues conditional use permits for private landfills in the unincorporated County areas. GHG emissions reductions have not been quantified or counted towards attainment of the County's CCAP target. Inclusion of GHG benefits achieved by BE-7 in

future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: Currently, all landfills serving the unincorporated County with at least 250,000 tons of waste-in-place have installed methane capture systems. Methane captured by these systems can be used to generate electricity. For example, Puente Hills Landfill Gas-to-Energy Facility provides enough electricity to power about 70,000 homes in the County. Similar facilities have also been implemented by the Sanitation Districts at the Calabasas Landfill and Spadra Landfill. Additionally, a gas-to-energy facility is operational at the Chiquita Canyon Landfill, and construction of such a facility is underway at the Sunshine Canyon Landfill. Implementation of BE-7 would accelerate gas-to-energy facilities at landfills throughout LA County.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Identify incentives for landfill biogas projects.
- Identify partners and potential landfill biogas projects.

Land Use and Transportation

LUT-1. Bicycle Programs and Supporting Facilities

Action Goal: Construct and improve bicycle infrastructure to increase biking and bicyclist access to transit and transit stations/hubs. Increase bicycle parking and "end-of-trip" facilities offered through the unincorporated County.

Co-Lead (Supporting) Entity: LA County Department of Public Works, Department of Public Health and Department of Regional Planning (other County Departments).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal and the approaches.

Additional Information: This action quantifies GHG reductions anticipated in 2020 as a result of implementation of the *Los Angeles County 2012 Bicycle Master Plan* (2012 Bicycle Master Plan), which would result in a reduction of vehicle miles travelled. The 2012 Bicycle Master Plan is a sub-element of the Transportation Element of the General Plan; it replaces the 1975 Plan of Bikeways. The 2012 Bicycle Master Plan will result in various bicycle-friendly policies and programs and proposes implementation of approximately 831 miles of new bikeways throughout the County through 2032.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Implement select programs of the 2012 Bicycle Master Plan.
- Work with transit station/hub property owners, private property owners/development and County facility managers on opportunities to provide "end-of-trip" facilities for bicycle riders, including showers, secure bicycle lockers, and changing spaces, as outlined in the County's Healthy Design Ordinance.

- Promote interdepartmental collaboration between Public Works and Parks and Recreation to increase bike access to public facilities, such as parks and libraries.
- Consider expanding existing and providing new bicycle facilities near parks.
- Identify gaps and deficiencies in the active transportation network and implement active transportation projects to address these deficiencies (approach will also support implementation of *LUT-2: Pedestrian Network and LUT-3: Transit Expansion*).
- Plan and implement infrastructure improvements to promote bicyclist "first mile—last mile" access to and from transit station/hub origin and destitution points.
- Develop measures and practices to determine: 1) the degree to which unincorporated area residents have access to transit, bicycle and pedestrian network; and 2) the usage of those networks (approach will also support implementation of LUT-2:*Pedestrian Network* and LUT-3: *Transit Expansion*). Priority should include be given to locations near schools, transit centers, parks, and bike and pedestrian priority routes.

LUT-2. Pedestrian Network

Action Goal: Construct and improve pedestrian infrastructure to increase walking and pedestrian access to transit and transit stations/hubs. Program the construction of pedestrian projects toward the goal of completing 15,000 linear feet of new pedestrian improvements/amenities per year.

Co-Lead (Supporting) Entity: LA County Department of Public Works, Department of Public Health and Department of Regional Planning (LA County Internal Services Division).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal and the approaches.

Additional Information: This action quantifies GHG reductions anticipated in 2020 as a result of implementation of the 2012 Bicycle Master Plan, which would result in a reduction of vehicle miles travelled. This action includes construction of new pedestrian infrastructure and improvements to facilities for pedestrians, consistent with the projects described in the 2012 Bicycle Master Plan. Actions to minimize pedestrian barriers and provision of traffic calming measures are also considered, consistent with the County's Healthy Design Ordinance and Transit-Oriented District station area plans.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Develop active transportation networks for Transit-Oriented District station area plans that will promote livability. The plans should provide a transit, bicycle and pedestrian access network that internally links all uses and connects to all existing or planned external streets contiguous with the project site. The plans will eliminate or minimize barriers to active transportation access and interconnectivity such as walls, landscaping, and slopes.
- Plan and implement infrastructure improvements to promote pedestrian "first mile—last mile" access to and from transit station/hub origin and destitution points.
- Provide traffic calming measures. Traffic calming features may include: marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, raised intersections,

median islands, tight corner radii, roundabouts or mini-circles, on-street parking, planter strips with street trees, chicanes/ chokers, and others.

- Promote interdepartmental collaboration between Regional Planning, Public Works, and Parks and Recreation to increase non-motorized access to public facilities such as parks, libraries, and trails.
- Implement policies to minimize conflicts between pedestrians and motorists. Identify intersections where large numbers of pedestrian/vehicle collisions are occurring in unincorporated areas and consider changes to increase pedestrian safety.

LUT-3. Transit Expansion

Action Goal: Collaborate with Los Angeles County Metropolitan Transportation Authority (LA Metro) on a transit program that prioritizes transit by creating bus priority lanes, improving transit facilities, reducing transit-passenger time, and providing bicycle parking near transit stations.

Lead (Supporting) Entity: LA County Department of Public Works (LA County Department of Regional Planning).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal and the approaches.

Additional Information: This action quantifies GHG reductions anticipated in 2020 from increased use of transit, which would reduce vehicle miles travelled.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Work with LA Metro on a transit program that prioritizes transit throughput over car throughput, and creates bus priority lanes. Improve transit facilities through sidewalk/ crosswalk safety enhancements and bus shelter improvements. Reduce transit-passenger travel time through more reduced headways and increased speed and reliability. Work with transit station/hub property owners to provide short-term and long-term bicycle parking near rail stations, transit stops, and freeway access points.
- Plan and implement local community transit and shuttle services that provide efficient connections to regional transit facilities. The local shuttles will provide service to transit hubs, commercial centers, and residential areas and connections to regional transit lines.
- Plan and implement infrastructure improvements to promote bicycle and pedestrian "first mile—last mile" access to and from transit station/hub origin and destitution points.

LUT-4. Travel Demand Management

Action Goal: Encourage ride- and bike-sharing programs and employer-sponsored vanpools and shuttles. Implement marketing strategies to publicize these programs and reduce commute trips.

Lead (Supporting) Entity: CEO Office of Workplace Programs (All County Departments).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal and the approaches.

Additional Information: This action quantifies GHG reductions anticipated in 2020 from reductions in vehicle miles travelled (fewer trips).

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Encourage ride-sharing programs and a permanent transportation management association membership and funding requirement. Funding may be provided by a Community Facilities District, County Service Area, or other non-revocable funding mechanism.
- Encourage market-based bicycle sharing programs that support bicycle use around and between transit stations/hubs.
- Implement marketing strategies to reduce commute trips. Information sharing and marketing are important components to successful commute-trip reduction strategies.
- Encourage employer-sponsored vanpools or shuttles. A vanpool will usually service employees' commute to work while a shuttle will service nearby transit. Employer-sponsored vanpool programs entail an employer purchasing or leasing vans for employee use, and often subsidizing the cost of at least program administration, if not more.

LUT-5. Car-Sharing Program

Action Goal: Implement a car-sharing program to allow people to have on-demand access to a shared fleet of vehicles on an as-needed basis.

Lead (Supporting) Entity: CEO Office of Workplace Programs (All County Departments).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal and the approaches.

Additional Information: User costs are typically determined through mileage or hourly rates, with deposits and/or annual membership fees. The car-sharing program could be created through a local partnership or through one of many existing car-share companies. Car-sharing programs may be grouped into three general categories: residential-based, employer-based, or transit station-based. All vehicles would be owned by residents or public/private entities (e.g., employers) other than the County. This action quantifies GHG reductions anticipated in 2020 from reductions in vehicle miles travelled (fewer trips).

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Residential-based programs that can work to substitute entire household based trips. These private car-sharing programs can be used for everyday trips throughout the unincorporated County. The County will investigate opportunities for private car-sharing companies to store their vehicles on the street or in public garages for a fee, which can help reduce operating costs, increase visibility, and provide easy and convenient public access to the shared vehicles.
- Employer-based programs that provide a means for business/day trips for alternative mode commuters and provide a guaranteed ride home option. The County will explore incentives to encourage employer-based programs, including allowing developers and building owners to replace required parking for spots with spots store shared vehicles.

- Transit station-based programs that focus on providing the *last-mile* solution and link transit with commuters' final destinations.

LUT-6. Land Use Design and Density

Action Goal: Promote sustainability in land use design, including diversity of urban and suburban developments.

Lead (Supporting) Entity: LA County Department of Regional Planning (LA County Department of Public Works).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal and the approaches.

Additional Information: This action quantifies GHG reductions anticipated in 2020 from reductions in vehicle miles travelled (fewer trips). This action includes approaches that encourage transit oriented districts (TODs), infill development, pedestrian-friendly and community-serving uses near transit stops, and increased transit use (as proposed in the General Plan).

Approaches: The following strategy could be used to help achieve the action goal and support implementation.

- Implement the County's Transit Oriented District Program and Healthy Design Ordinance.

LUT-7. Transportation Signal Synchronization Program

Action Goal: Improve the network of traffic signals on the major streets throughout LA County.

Lead (Supporting) Entity: LA County Department of Public Works.

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on anticipated emissions reductions achieved through implementation of the Transportation Signal Synchronization Program (TSSP).

Additional Information: The TSSP implements innovative, low-cost operational improvements to the network of traffic signals on the major streets throughout LA County. Upgrading traffic signals improves mobility on congested roadways and reduces GHG emissions through reduced vehicle idle time. The County will continue implementation of its TSSP with a goal of completing 38 additional routes (16 new and 22 to be redone) between 2010 and 2020.

Approaches: The following strategy could be used to help achieve the action goal and support implementation.

- Continue to implement projects for signal improvements.
- Identify additional funding opportunities to expand project implementation.

LUT-8. Electric Vehicle Infrastructure

Action Goal: Install 500 electric vehicle (EV) charging facilities at County-owned public venues (e.g., hospitals, beaches, stand-alone parking facilities, cultural institutions, and other facilities) and ensure that at least one-third of these charging stations will be available for visitor use. Expanding

the number of EV charging opportunities for the public will help the County meet and exceed future projections for anticipated plug-in electric vehicle (PEV) registrations.[10]

Lead (Supporting) Entity: LA County Internal Services Department (LA County Department of Public Works, LA County Department of Regional Planning).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target.

Additional Information: Plug-in hybrid electric vehicles and other low-emission vehicles reduce air pollution, decrease dependency on fossil fuels, and support green businesses.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Streamline the County's permitting and inspection process for EV retrofits.
- Revise the Title 22 zoning ordinance to allow EV charging as a use by-right or with a permit as appropriate.

LUT-9. Idling Reduction Goal

Action Goal: Encourage idling limits of 3 minutes for heavy-duty construction equipment, as feasible within manufacturer's specifications.

Lead (Supporting) Entity: LA County Department of Regional Planning (LA County Department of Public Works, LA County Department of Public Health).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

Additional Information: The current idling limit adopted by the California Air Resources Board (CARB) and local air district regulations is 5 minutes. This action will promote an idling limit of 3 minutes and encourage contractors to submit a construction vehicle management plan that includes the following information: idling time goals; requiring hour meters on equipment; and documenting the serial number, horsepower, age, and fuel of all onsite equipment.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Initiate development of an idling ordinance or policy that outlines goals for reduced equipment idling.
- Develop an outreach and education program.

LUT-10. Efficient Goods Movement

Action Goal: Support regional efforts to maximize the efficiency of the goods movement system throughout the unincorporated areas.

[10] SCAG's PEV Atlas estimates 300,000 cumulative PEV registrations in LA County (incorporated and unincorporated areas) by 2020.

Lead (Supporting) Entity: LA County Department of Public Works (LA County Department of Regional Planning).

Action Status: Implementation of specific goods movement efficiency measures is at the discretion of regional transportation agencies (e.g., Southern California Association of Governments [SCAG]). LA County will support action implementation and provide permitting assistance as needed. Given the County's supporting role in this measure, GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by LUT-10 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: Goods are distributed to County residents and businesses through freight, rail, and air. Improving the efficiency of goods movement will not only reduce GHG emissions and environmental impacts, but also support economic competitiveness and local job creation. SCAG has adopted an efficient goods movement strategy as part of their Final 2012 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) to achieve these environmental and economic goals. SCAG's strategy outlines policies to develop a coordinated Southern California goods movement system that accommodates growth and freight throughput in the region. CCAP action LUT-10 will support implementation of SCAG's strategy in the unincorporated County.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Support efforts to evaluate zero and/or near-zero emission freight corridors.
- Work with appropriate agencies and partners to identify and replace at-grade railroad crossings to reduce freight delay and vehicle idling.

LUT-11. Sustainable Pavements Program

Action Goal: Reduce energy consumption and waste generation associated with pavement maintenance and rehabilitation.

Lead (Supporting) Entity: LA County Department of Public Works.

Action Status: GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by LUT-11 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: The Sustainable Pavements Program maintains and rehabilitates aging roadways throughout the County. The program utilities a three-pronged sustainable approach where 1) roads in good condition are actively maintained, 2) recycled materials are used in treatment selections, and 3) existing materials are reutilized for reconstruction projects. These actions reduce GHG emissions through vehicle fuel savings and materials reduction. CCAP action LUT-11 will continue implementation of the sustainable pavements program.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Identify potential projects for pavement improvements.
- Identify additional funding opportunities to expand project implementation.

- Investigate opportunities to use new materials that are more effective or achieve cost savings.
- Investigate opportunities to use cool or porous pavements, as feasible, to reduce urban heat island effect and conserve water.

LUT-12. Electrify Construction and Landscaping Equipment

Action Goal: Utilize electric equipment wherever feasible for construction projects. Reduce the use of gas-powered landscaping equipment.

Lead (Supporting) Entity: LA County Department of Public Works (LA County Department of Regional Planning, LA County Department of Parks and Recreation, Beaches and Harbors).

Action Status: GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by LUT-12 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: Electric equipment goals for construction equipment will be encouraged for new development projects in the County. The County may also work with construction contractors to determine the components of their fleets. Cross-jurisdiction coordination (e.g., with the South Coast Air Quality Management District) will be pursued to support increased use of electric landscaping equipment.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Encourage new development to include electrical outlets on the exterior of buildings, which must be accessible so that the electric landscaping equipment can be charged.
- Implement incentive programs, such as a rebate for purchasing electric lawnmowers or other electric equipment.
- Continue to implement a lawnmower exchange program.

Water Conservation and Wastewater

WAW-1. Per Capita Water Use Reduction Goal

Action Goal: Meet the State established per capita water use reduction goal[11] as identified by Senate Bill (SB) X7-7 for 2020.

Lead (Supporting) Entity: LA County Department of Public Works (Local Water Agencies, LA County Department of Regional Planning, LA County Internal Services Department).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

[11] The State goal is a 20% reduction in per capita water use compared to baseline levels.

Additional Information: This action will reduce embodied energy use associated with water conveyance and treatment, along with fugitive emissions associated with wastewater treatment processes resulting from treatment of wastewater generated within unincorporated county borders. Specific per capita water use reduction goals vary by water agency (e.g., Walnut Valley Water District) and range from 5 to 20% below baseline values.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Promote water audit programs in collaboration with efforts by local water purveyors that offer free water audits to single-family, multifamily, large landscape accounts, and commercial customers. Collaborate with purveyors to enact programs to install ultra-low-flush toilets in facilities and other conservation programs for commercial, industrial, and institutional (CII) accounts
- Support local water agencies in promoting use of water-efficient appliances, plumbing and irrigation systems, and aggressive water savings targets.
- Expand upon the County's Drought-Tolerant Landscaping Ordinance and the State's Model Water Efficiency Landscape Ordinance (MWELO), which currently require the reduction of outdoor potable water use by 70% of the evapotranspiration rate for projects with landscaping of greater than 2,500 square-feet. Additional water reductions can be achieved by promoting underground irrigation techniques, requiring timing limits for watering, and requiring water-efficient irrigation equipment.
- Support requirements for water efficiency upgrades in the renovation or expansion of existing buildings.
- Promote incentive programs for projects that demonstrate significant water conservation through use of innovative water consumption technologies.
- Collaborate in sponsoring water efficiency training and certification for irrigation designers and installers and property managers.
- Expand upon the Smart Gardening campaign by providing more public education and outreach to promote the use of drought-tolerant and slow-growing plants to reduce green waste generation while encouraging water conservation. The Smart Gardening campaign will highlight specific water-wasting activities to discourage, such as the watering of non-vegetated surfaces and using water to clean sidewalks and driveways, as well as educate the community about the importance of water conserving techniques.

WAW-2. Recycled Water Use, Water Supply Improvement Programs, and Stormwater Runoff

Action Goal: Promote the use of wastewater and gray water to be used for agricultural, industrial, and irrigation purposes consistent with the appropriate provisions of Title 22 and approval of the California Department of Health Services. Manage stormwater, reduce potential treatment, and protect local groundwater supplies.

Lead (Supporting) Entity: LA County Department of Public Works (LA County Department of Parks and Recreation, LA County Department of Regional Planning, LA County Internal Services Department).[12]

Action Status: GHG emissions reductions achieved by the following LA County Department of Parks and Recreation recycled water projects have been quantified.

- Rimgrove recycled water project.
- Pathfinder recycled water project.

GHG reductions of larger efforts to promote the use of wastewater and gray water have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of additional GHG benefits achieved by WAW-2 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions. Reduction of potable water use, either by conservation or replacement with recycled water, obviates the need to import similar water quantities through the State Water Project. On average, a million gallons of water imported into the unincorporated Los Angeles area requires approximately 7,222 kWh of electricity. At a future 2020 GHG production of 0.63 pound per kWh,[13] a million gallons of avoided pumping reduces GHG emissions by 4,526 pounds of CO_2 equivalent.

Additional Information: The current Low Impact Development (LID) Ordinance also requires stormwater management strategies, which include onsite infiltration/retention, use of rain barrels, runoff management, as well as:

- Mimic undeveloped stormwater runoff rates and volumes.
- Prevent pollutants of concern from leaving the development site in stormwater.
- Minimize hydromodification impacts on natural drainage systems.
- Non-Designated[14] residential projects of less than five units must implement at least two LID best management practices, such as disconnecting impervious surfaces, using porous pavement, downspout routing, installing a dry well, smart landscaping and irrigation requirements, or a green roof.
- Non-Designated[18], residential projects of five units or more, Non-Designated[18], Non-Residential projects, and Designated[15] projects must comply with infiltration and runoff management requirements.

[12] WAW-2 includes a number of discrete activities related to recycled water use. As such, the implementing entities will have distinct responsibilities, consistent with their department goals. DPW will be responsible for long-range recycled water planning and infrastructure development. DPR will coordinate internal recycled water projects, including the Rimgrove and Pathfinder projects. DRP will encourage the use of recycled water on private properties. The Los Angeles County Internal Services Department (ISD) can provide a support role for the water recycling aspect of Action Goal WAW-2. Currently, ISD handles planning and implementation of recycled water projects for County facilities (excluding spreading grounds) and has the expertise in this sector. The four departments will collaborate to ensure the action goal is achieved and all components of the action are implemented.

[13] Production rate assumes 33% of the State's electricity in 2020 will be provided by renewable energy. Carbon intensity assumes the San Onofre Nuclear Generation Station (SONGS) is replaced by natural gas (refer to Appendix B for additional information).

[14] Non-Designated projects are defined in Los Angeles County Code Section 12.84.430B.

[15] Designated projects are defined in Los Angeles County Code Section 12.84.430A.

Approaches: The following strategies may be used to help achieve the action goal and support implementation. Requirements of WAW-2 will be adopted as part of the County' LID Ordinance. New LID practices should be coordinated with the Los Angeles Regional Water Quality Control Board and support projects that are consistent with regional efforts to reduce stormwater runoff (pursuant to MS4 Permit Order).

- Coordinate with water agencies to implement and support groundwater development management plans.
- Inventory potential non-potable uses of water for potential substitution by recycled and/or gray water. Prioritize infrastructure projects identified in the Department of Parks and Recreation's Recycled Water Master Plan.
- Encourage the retrofit of irrigation systems to promote the use of recycled water at golf courses, parks and open spaces owned and operated by other entities, and take the lead in implementing these modifications at County-owned and operated greenbelt facilities.
- Encourage the retrofit of single-family and multi-family homes to promote the use of graywater for landscaping and irrigation.
- Continue to collaborate with responsible agencies to encourage the use of recycled water where cost and energy efficiencies for its production, distribution, and use are favorable.
- Participate in and support regional programs and projects that target the improvement and conservation of the region's groundwater and surface water supplies.
- Consider programs to collect stormwater for onsite reuse for landscape irrigation.
- Participate in and support regional programs and projects that target the improvement and conservation of the region's groundwater and surface water supplies.

Waste Reduction, Reuse and Recycling

SW-1. Waste Diversion Goal

Action Goal: For the County's unincorporated areas, adopt a waste diversion goal to comply with all state mandates to divert at least 75% of waste from landfill disposal by 2020.

Lead (Supporting) Entity: LA County Department of Public Works (LA County Department of Regional Planning).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

Additional Information: The County has established a comprehensive waste collection and recycling system that is designed to reduce the amount of trash that is sent to regional landfills. This system incorporates a variety of programs that collectively divert over 50% of the waste generated in the County. Implementation of SW-1 will increase the amount of diverted waste to at least 75%. The County will strive to achieve this goal by working to expand or establish composting, recycling, and yard waste programs made available to residences and businesses. Since waste generated in the unincorporated county is hauled by private waste services providers, the County's role will be to

work with the waste services providers to expand services and to support or organize education and outreach programs.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Exceed the waste diversion requirement set by AB 939 and incorporated into LA County Code Chapter 20.87 to ensure that a minimum of 70% of construction and building materials and demolition debris (C&D) are diverted from landfill disposal. Require contractors to submit a recycling and reuse plan (RRP) and use separate material bins at the construction site.
- Provide compost receptacles for food waste and other green waste.
- Implement an education program to educate county residents on the benefits of composting, what to compost, and how to compost.
- Promote financing mechanisms and opportunities to increase waste diversion. Funding mechanism could include State and federal grants, low-interest loans, self-funding, and revolving fund programs. PACE and Energy Upgrade California could also be expanded to include waste management and diversion funding.
- Expand upon the Clean LA Recycle Program and provide waste education and public outreach. The education program should include information on commercial and residential recycling, reuse, waste reduction, composting, grass cycling, and waste prevention. These materials should be available to the public at the County's ESCs.
- Encourage local recycling and composting initiatives at the neighborhood level.
- Encourage local businesses to expand their recycling and composting efforts and to reduce packaging of products manufactured in the unincorporated county.
- Enhance regional coordination on waste management practices, to take advantage of economies of scale of recycling, composting, and other diversion programs.
- Enhance material recovery programs at County-owned and operated solid waste facilities.
- Work with independent recyclers to encourage material recovery programs at privately owned solid waste facilities.
- Promote the development of alternative-to-landfill technology facilities, such as conversion technologies, capable of converting green waste, food waste, municipal solid waste residuals, or other organic materials into green energy, fuels, and other beneficial products. These technologies have the potential to lower GHG emissions, reduce reliance on landfills, reduce waste transportation, and increase the production of local renewable energy, green fuels, and other beneficial products.

Land Conservation and Tree Planting

LC-1. Develop Urban Forests

Action Goal: Support and expand urban forest programs within the unincorporated areas.

Lead (Supporting) Entity: LA County Fire (LA County Department of Regional Planning, LA County Department of Parks and Recreation).

Action Status: GHG emissions benefits have been quantified and counted toward attainment of the County's CCAP target based on the metrics identified in the action goal.

Additional Information: LA County Fire's Urban Forestry Programs distribute over 22,422 seedlings to unincorporated County residents and businesses each year. This action requires an evaluation of the feasibility of expanding tree planting in the unincorporated county, including evaluation of potential carbon sequestration from different tree species, potential reductions of building energy from shading, and GHG emissions associated with pumping water used for irrigation.

Approaches: The following strategies may be used to help achieve the action goal and support implementation:

- Conduct a tree inventory to identify tree-deficient neighborhoods. Target these areas for tree distribution and planting.
- Consider planting a portion of trees along pedestrian and bike route. Although these trees will not contribute to building energy reductions, they will provide shade and enhanced aesthetics that may encourage pedestrian and biking activities.
- Support implementation of the tree planting requirements for new developments, consistent with the County's Green Building Ordinance.
- Prioritize drought-tolerant, native, and non-flammable trees to support water conservation efforts, minimize the spread of invasive species, and reduce fire risk.

LC-2. Create New Vegetated Open Space

Action Goal: Restore and revegetate previously disturbed land and/or unused urban and suburban areas.

Lead (Supporting) Entity: LA County Fire (LA County Department of Regional Planning, LA County Department of Parks and Recreation, LA County Department of Public Works).

Action Status: GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by LC-2 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: LA County has been dedicated to resource conservation and expansion of open space for decades. This action builds on existing initiatives and encourages the restoration and revegetation of previously disturbed land in order to promote carbon sequestration in the unincorporated county. It also promotes the conversion of unused urban and suburban areas to parks and forests.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Prioritize creation of contiguous habitat to support species migration and overall ecosystem stability and resiliency in addition to GHG benefits.
- Offer incentives for voluntary creation of open space on private property.
- Provide funding for landowners to purchase conservation easements.
- Quantify the economic and environmental benefits of newly created open space.

- Coordinate with local restoration banks to explore opportunities to support both carbon offsets and active restoration of ecological resources and habitats.
- Prioritize drought-tolerant native plantings to support water conservation efforts and minimize the spread of invasive species. Planting strategies to minimize fuel loading and reduce wildfire risk will also be prioritized.

LC-3. Promote the Sale of Locally Grown Foods and/or Products

Action Goal: Establish local farmers markets and support locally grown food.

Lead (Supporting) Entity: LA County Department of Regional Planning (LA County Agricultural Commissioner, LA County Department of Public Health).

Action Status: GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by LC-3 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions. Successful farmer's markets have been established throughout LA County. This action would expand the number of markets within the unincorporated community. The sale of local food from organic farms in LA County will be prioritized, followed by products from surrounding agricultural areas (e.g., San Joaquin Valley, Ventura County).

Additional Information: Establishing local farmer's markets has the potential to provide community residents with a local source of food, protect local agricultural lands, and support local agricultural jobs. Co-benefits associated with locally grown foods include reduced vehicle miles traveled, as well as displaced carbon-intensive food production practices (if the food is grown organically).

Approaches: The County will expand the Healthy Design Ordinance to encourage and support farmers markets at community parks.

LC-4. Protect Conservation Areas

Action Goal: Encourage the protection of existing land conservation areas.

Lead (Supporting) Entity: LA County Department of Regional Planning (LA County Department of Parks and Recreation, LA County Department of Public Works).

Action Status: GHG emissions reductions have not been quantified or counted toward attainment of the County's CCAP target. Inclusion of GHG benefits achieved by LC-4 in future CCAP updates is contingent on project implementation and the development of metrics to track emissions reductions.

Additional Information: Forested, oak woodland, hillsides, ridgelines, wetland areas, and some community parks and open spaces can provide carbon sink benefits by sequestering atmospheric CO_2. Conservation areas can also provide a diverse suite of community benefits, including recreation, economic, and aesthetics. Accordingly, the County will prioritize these conservation areas that benefit multiple end uses.

Approaches: The following strategies may be used to help achieve the action goal and support implementation.

- Implement strategies recommended in the Oak Woodland Conservation Management Plan to preserve existing oak woodland and result in no net loss of oak woodland from existing value.
- Inventory environmental (e.g., CO_2 sequestration, endangered species habitat creation), economic (e.g., commodities), and public (e.g., recreation) benefits provided by conservation areas and land uses within the unincorporated County.
- Improve understanding and appreciation for natural areas through preservation programs and educational facilities.
- Protected areas should be managed to minimize the spread of invasive species.

State Actions

STATE-1. Renewables Portfolio Standard

State Program Goal: The Renewables Portfolio Standard (RPS) obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure an additional 1% of retail sales per year from eligible renewable sources until 20% is reached, no later than 2010. Executive Order (EO) S-14-08 also sets forth a longer range target of procuring 33% of retail sales by 2020.

Additional Information: In the ongoing effort to codify the ambitious 33% by 2020 goal, SB X1-2 was signed by Governor Edmund G. Brown, Jr., in April 2011. This new RPS preempts CARB's 33% Renewable Electricity Standard and applies to all electricity retailers in the State including publicly owned utilities (POUs), IOUs, ESPs, and CCAs. All of these entities must adopt the new RPS goals of 20% of retails sales from renewables by the end of 2013, 25% by the end of 2016, and the 33% requirement by the end of 2020.

STATE-2. Title 24: Standards for Commercial and Residential Buildings (Energy Efficiency and CALGREEN)

State Program Goal: Title 24 requires that building shells and building components be designed to conserve energy and water. CALGREEN mandatory and voluntary measures became effective on January 1, 2011, and the guidelines will be periodically updated.[16] The current energy efficiency standards in Title 24 were last adopted in 2008. The 2013 Title 24 energy efficiency standards will take effect in 2014 and are planned to be updated periodically afterward.

STATE-3. Pavley/Advanced Clean Cars (Vehicle Efficiency) and Low Carbon Fuel Standard for On-road Transportation

State Program Goal: AB 1493 (Pavley) will reduce GHG emissions from automobiles and light duty trucks (2009 model years and newer) by 30% from 2002 levels by the year 2016. The Advanced Clean Car rules will further reduce GHG emissions from automobiles and light duty trucks for 2017–

[16] Implementation of the CALGREEN voluntary measures, which would exceed the mandatory efficiency standards, is encouraged for new development under BE-1, *Green Building Development.*

2025 vehicle model years. The State's vehicle efficiency standards have been harmonized with federal vehicle efficiency standards. The LCFS would reduce GHG emissions by requiring a low carbon intensity of transportation fuels sold in California by at least 10% by the year 2020. The regulation has been adopted.

STATE-4. Low Carbon Fuel Standard for Off-road Equipment and Vehicles

State Program Goal: The low carbon fuel standard (LCFS) would reduce GHG emissions by requiring a low carbon intensity of transportation fuels sold in California by at least 10% by the year 2020. The regulation has been adopted.

STATE-5. California Cap-and-Trade Program

State Program Goal: The California cap-and-trade program creates a market-based system with an overall emissions limit for affected sectors. The program is currently proposed to regulate more than 85% of California's emissions and will stagger compliance requirements according to the following schedule: (1) electricity generation and large industrial sources (2013); (2) fuel combustion and transportation (2015). The first auction occurred in late 2012 with the first compliance year in 2013.

Appendix D
Reduction Measure Comparison to General Plan Policies

The Community Climate Action Plan (CCAP) is a component of the Air Quality Element of the General Plan. This appendix relates the CCAP actions to the policies outlined in the General Plan. Existing programs in the County that could be expanded or used to support individual actions are also identified.

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Proposed CCAP Measure		Measure Analysis	
Title	**Goal**	**Relevant General Plan Policies (2035 General Plan)**	**Relevant Local Programs**
Green Building and Energy			
BE-1. Green Building Development	Promote and incentivize at least Tier 1 voluntary standards within CALGREEN for all new residential and nonresidential buildings. Develop a heat island reduction plan and facilitate green building development by removing regulatory and procedural barriers.	• **Land Use:** LU 8.4, LU 10.1, LU 10.5 • **Air Quality:** AQ 1.1, AQ 3.4, AQ 3.5 • **Conservation and Natural Resources:** C/NR 12.2 • **Economic Development:** ED 2.4	• LA County Code, Title 31Southern California Edison (SCE) commercial and residential energy efficiency incentives • LA Commercial Building Performance Partnership • Energy Upgrade California for Los Angeles
BE-2. Energy Efficiency Programs	Conduct energy efficiency retrofits for at least 25% of existing commercial buildings over 50,000 square feet and at least 5% of existing single-family residential buildings. Promote innovative, low-interest financing for energy efficiency projects for existing development. Create energy conservation campaigns and partner with utilities and other entities on energy efficiency.	• **Air Quality:** AQ 3.4 • **Economic Development:** ED 4.9	• LA Commercial Building Performance Partnership • SCE commercial and residential energy efficiency incentives • Energy Upgrade California for Los Angeles
BE-3. Solar Installations	Promote and incentivize solar installations for new and existing homes, commercial buildings, carports and parking areas, water heaters, and warehouses.	• **Air Quality:** AQ 1.1, AQ 3.4 • **Conservation and Natural Resources:** C/NR 12.1, C/NR 12.2 • **Public Services and Facilities:** PS/F 6.7 • **Economic Development:** ED 1.2, ED 2.4	• SCE's California Solar Initiative • LA County Renewable Energy Ordinance
BE-4. Alternative Renewable Energy Programs	Implement pilot projects for wind, geothermal, and other currently viable forms of alternative renewable energy.[1]	• **Air Quality:** AQ 1.1, AQ 3.4 • **Conservation and Natural Resources:** C/NR 12.1, C/NR 12.2 • **Parks and Recreation:** P/R 6.2 • **Public Services and Facilities:** PS/F 6.5, PS/F 6.7 • **Economic Development:** ED 1.2, ED 2.4	• SCE Commercial Self Generation Incentive Program (SGIP). • LA County Renewable Energy Ordinance
BE-5. Wastewater Treatment Plant Biogas	Encourage renewable biogas projects.	• **Conservation and Natural Resources:** C/NR 12.1	• LA County Sanitation District Renewable Energy and Clean Fuels Program
BE-6. Encourage Energy Efficiency Retrofits of Wastewater Equipment	Encourage the upgrade and replacement of wastewater treatment and pumping equipment.	• **Air Quality:** AQ 3.2, AQ 3.3, AQ 3.5 • **Public Services and Facilities:** PS/F 4.1, PS/F 4.2	
BE-7. Landfill Biogas	Partner with the owners and operators of landfills with at least 250,000 tons of waste-in-place to identify incentives to capture and clean landfill gas to beneficially use the biogas to generate electricity, produce biofuels, or otherwise offset natural gas or other fossil fuels.	• **Air Quality:** AQ 3.4 • **Public Services and Facilities:** PS/F 6.7	• LA County Sanitation District Renewable Energy and Clean Fuels Program
Land Use and Transportation			
LUT-1. Bicycle Programs and Supporting Facilities	Construct and improve bicycle infrastructure to increase biking and bicyclist access to transit and transit stations/hubs. Increase bicycle parking and "end-of-trip" facilities offered through the unincorporated County.	• **Land Use:** LU 5.4, LU 8.6, LU 8.7, LU 9.2, LU 9.3, LU 10.1 • **Mobility:** M 2.1, M 2.2, M 2.3, M 2.5, M 2.6, M 2.7, M 2.8, M 2.10, M 2.11, M. 4.1, M 5.3, M 5.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• LA Metro's Countywide Sustainability Planning Program • LA County 2012 Bicycle Master Plan • LA County Healthy Design Ordinance
LUT-2. Pedestrian Network	Construct and improve pedestrian infrastructure to increase walking and pedestrian access to transit and transit stations/hubs. Construct 15,000 linear feet of pedestrian improvements per year.	• **Land Use:** LU 5.4, LU 8.6, LU 8.7, LU 9.2, LU 9.3, LU 10.1 • **Mobility:** M 2.1, M 2.2, M 2.3, M 2.4, M 2.6, M 2.7, M 2.8, M 2.10, M 2.11, M 4.1, M 5.1, M 5.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• LA County Healthy Design Ordinance

[1] Potential future forms of non-GHG energy could include nuclear fusion, which is being researched by many parties, including the Lockheed Martin Skunk Works in Palmdale, but which has not yet been experimentally proven as a viable commercial energy source. As new technologies become proven, the County will consider how they can support further development and deployment of such technologies.

Proposed CCAP Measure		Measure Analysis	
Title	**Goal**	**Relevant General Plan Policies (2035 General Plan)**	**Relevant Local Programs**
LUT-3. Transit Expansion	Work with Los Angeles County Metropolitan Transportation Authority (LA Metro) on a transit program that prioritizes transit by creating bus priority lanes, improving transit facilities, reducing transit-passenger time, and providing bicycle parking near transit stations. Construct and improve bicycle, pedestrian and transit infrastructure to increase bicyclist and pedestrian access to transit and transit stations/hubs.	• **Land Use:** LU 5.4, LU 8.6, LU 8.7, LU 9.2, LU 9.3, LU 10.1 • **Mobility:** M 2.6, M 2.10, M 4.1, M 4.15, M 5.3, M 5.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• LA Metro's Countywide Sustainability Planning Program • LA County proposed Transit Oriented Districts • LA County Healthy Design Ordinance
LUT-4. Travel Demand Management	Encourage ride- and bike-sharing programs and employer-sponsored vanpools and shuttles. Encourage market-based bike sharing programs that support bicycle use around and between transit stations/hubs. Implement marketing strategies to publicize these programs and reduce commute trips.	• **Land Use:** LU 5.4, LU 8.6, LU 8.7, LU 9.2, LU 9.3, LU 10.1 • **Mobility:** M 4.1, M 4.2, M 4.15, M 5.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• South Coast Air Quality Management District's (SCAQMD's) Rule 2202, Employee Commute Trip Reduction Program • LA County's internal Commuter Benefit Plan
LUT-5. Car-Sharing Program	Implement a car-sharing program to allow people to have on-demand access to a shared fleet of vehicles on an as-needed basis.	• **Land Use:** LU 5.4, LU 8.6, LU 8.7, LU 9.2, LU 9.3, LU 10.1 • **Mobility:** M 4.1, M 4.4, M 4.15, M 5.3, M 5.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• Los Angeles Zipcar (City program)
LUT-6. Land Use Design and Density	Promote sustainability in land use design, including diversity of urban and suburban developments.	• **Land Use:** LU 5.4, LU 8.6, LU 8.7, LU 9.2, LU 9.3, LU 10.1 • **Mobility:** M 2.1, M 2.2, M 2.3, M. 2.4, M 2.5, M 2.6, M 2.7, M 2.8, M 2.10, M 2.11, M 4.10, M 5.1, M 5.3, M 5.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• Southern California Association of Government's (SCAG's) Final 2012–2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS)
LUT-7. Transportation Signal Synchronization Program	Improve the network of traffic signals on the major streets throughout Los Angeles (LA) County.	• **Mobility:** M 2.3, M 4.3, M 4.5, M 4.11 • **Economic Development:** ED 3.2	• LA County Transportation Signal Synchronization Program
LUT-8. Electric Vehicle Infrastructure	Install 500 electric vehicle (EV) charging facilities at County-owned public venues (e.g., hospitals, beaches, stand-alone parking facilities, cultural institutions, and other facilities) and ensure that at least one-third of these charging stations will be available for visitor use.	• **Mobility:** M 7.4 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• SCAG's Southern California Plug-in Electric Vehicle Readiness Plan and Atlas
LUT-9. Idling Reduction Goal	Encourage idling limits of 3 minutes for heavy-duty construction equipment, as feasible within manufacturer's specifications.	• **Air Quality:** AQ 1.4, AQ 2.6, AQ 3.4	
LUT-10. Efficient Goods Movement	Support regional efforts to maximize the efficiency of the goods movement system throughout the unincorporated areas.	• **Mobility:** M 6.1, M 6.3, M 6.5 • **Air Quality:** AQ 2.4 • **Economic Development:** ED 3.2	• SCAG's Goods Movement Program • LA Metro's Multi-County Goods Movement Action Plan
LUT-11. Sustainable Pavements Program	Reduce energy consumption and waste generation associated with pavement maintenance and rehabilitation.	• **Mobility:** M 7.1, M 7.2	• LA County Sustainable Pavements Program
LUT-12. Electrify Construction and Landscaping Equipment	Utilize electric equipment wherever feasible for construction projects. Reduce the use of gas-powered landscaping equipment.	• **Air Quality:** AQ 2.6, AQ 3.5	• South Coast Air Quality Management District (SCAQMD) Mow Down Air Pollution Electric Vehicle Lawn Mower Exchange • SCAQMD Lawn Mower and Leaf Blower Exchange Program
Water Conservation and Wastewater			
WAW-1. Per Capita Water Use Reduction Goal	Meet the State established per capita water use reduction goal[2] as identified by Senate Bill (SB) X7-7 for 2020.	• **Air Quality:** AQ 3.3, AQ 3.4 • **Conservation and Natural Resources:** C/NR 9.2 • **Parks and Recreation:** P/R 6.1, P/R 6.4, P/R 6.5 • **Public Services and Facilities:** PS/F 2.1, PS/F 2.2	• LA County Water Conservation Rebates • LA County Smart Gardening workshops • LA County Cash for Grass Program
WAW-2. Recycled Water Use, Water Supply Improvement Programs, and Stormwater Runoff	Promote the use of wastewater and gray water to be used for agricultural, industrial, and irrigation purposes. Manage stormwater, reduce potential treatment, and protect local groundwater supplies.	• **Mobility:** M 7.1, M 7.2 • **Conservation and Natural Resources:** C/NR 9.1 • **Parks and Recreation:** P/R 6.1 • **Public Services and Facilities:** PS/F 3.1, PS/F 3.2, PS/F 4.1, PS/F 4.2, PS/F 4.3	• Stormwater & Runoff Pollution Control Program

[2] The State goal is a 20% reduction in per capita water use compared to baseline levels.

Proposed CCAP Measure		Measure Analysis	
Title	**Goal**	**Relevant General Plan Policies (2035 General Plan)**	**Relevant Local Programs**
Waste Reduction, Reuse, and Recycling			
SW-1. Waste Diversion Goal	For the County's unincorporated areas, adopt a waste diversion goal to comply with all state mandates to divert at least 75% of waste from landfill disposal by 2020.	• **Public Services and Facilities:** PS/F 5.1, PS/F 5.2, PS/F 5.4, PS/F 5.5, PS/F 5.6, PS/F 5.7, PS/F 5.8, PS/F 5.9	• Clean LA Recycle Programs • SCE Residential Appliance Recycling Program • Construction and Demolition Debris Recycling and Reuse Program
Land Conservation and Tree Planting			
LC-1. Develop Urban Forests	Support and expand urban forest programs within the unincorporated areas.	• **Mobility:** M 2.9	• LA County Department of Parks and Recreation Urban Forestry Plan • LA County Green Building Ordinance • Mitigation-based ongoing tree planting efforts
LC-2. Create New Vegetated Open Space	Restore and revegetate previously disturbed land and/or unused urban and suburban areas.	• **Conservation and Natural Resources:** C/NR 1.3, C/NR 1.5, C/NR 1.6, C/NR 2.1, C/NR 2.2, C/NR 2.4	
LC-3. Promote the Sale of Locally Grown Foods and/or Products	Establish local farmers markets and support locally grown food.	• **Land Use:** LU 8.9, LU 8.11, LU 9.4, LU 9.5 • **Conservation and Natural Resources:** C/NR 8.1, C/NR 8.2, C/NR 8.3, C/NR 9.3, C/NR 9.4 • **Economic Development:** ED 2.9, ED4.6, ED 4.7, ED 4.8	• LA County Healthy Design Ordinance
LC-4. Protect Conservation Areas	Encourage the protection of existing land conservation areas.	• **Land Use:** LU 1.6, LU 3.1, LU 3.3 • **Conservation and Natural Resources:** C/NR 1.1, C/NR 1.2, C/NR 1.5, C/NR 2.1, C/NR 2.3, C/NR 2.4, C/NR 4.1 • **Parks and Recreation:** P/R 5.3	• LA County Oak Woodlands Conservation Management Plan

Appendix E
Acronyms and Abbreviations

AF	acre-foot
AB	Assembly Bill
AC	Agricultural Commissioner
BAU	business as usual
BH	Beaches and Harbors
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCAP	community climate action plan
CCAR	California Climate Action Registry
CEQA	California Environmental Quality Act
CH_4	methane
CIT	CCAP Implementation Team
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COS	County's Office of Sustainability
County	County of Los Angeles
DPH	Los Angeles County Department of Public Health
DPR	Los Angeles County Department of Parks and Recreation
DPW	Los Angeles County Department of Public Works
DRP	Los Angeles County Department of Regional Planning
EIR	Environmental Impact Report
EV	electric vehicle
EVSE	electric vehicle supply equipment
Fire	Los Angeles County Fire Department
GHG	greenhouse gas
GWP	Global Warming Potential
HFCs	hydrofluorocarbons
ISD	Los Angeles County Internal Services Department
kW	kilowatt
LA Basin Study	Los Angeles Basin Stormwater Conservation Study
LADWP	Los Angeles Department of Water and Power
LARC	Los Angeles Regional Collaborative for Climate Action and Sustainability
LID	Low Impact Development
MTA	Metropolitan Transportation Authority
MCAP	municipal climate action plan
MT CO_2e	metric tons of carbon dioxide equivalents
MWELO	Model Water Efficiency Landscape Ordinance

N_2O	nitrous oxide
NPV	net present value
PACE	Property Assessed Clean Energy
PFCs	perfluorinated carbons
RPS	Renewable Portfolio Standard
RTP/SCS	2012Regional Transportation Plan/Sustainable Communities Strategy
SB	Senate Bill
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SCAQMD	South Coast Air Quality Management District
SREC	Solar Renewable Energy Certificate
SF_6	sulfur hexafluoride
TSSP	Transportation Signal Synchronization Program
UCLA	University of California, Los Angeles
VMT	vehicle miles traveled